

INTEGRATING NEW LITERACY INSTRUCTION TO SUPPORT ONLINE
READING COMPREHENSION: AN EXAMINATION OF ONLINE LITERACY
PERFORMANCE IN 5th GRADE CLASSROOMS

A DISSERTATION
SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE
DOCTOR OF PHILOSOPHY

BY
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ABSTRACT

DISSERTATION PROJECT:

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This quantitative study explored the effect of intervention lessons on online reading skills in fifth grade classrooms. First, it sought to examine the relationships among demographic variables including gender, ethnicity, and socioeconomic status and self-reported Internet use and Internet ability. Second, this study was designed to investigate which variables best predict performance on a measure of online reading. Third, the effect of lessons designed to improve online reading comprehension was explored to determine the efficacy of targeted classroom-based instruction on learned skills.

Three theoretical frameworks underpinned this study: 1) a new literacies framework (Leu, Kinzer, Coiro, & Cammack, 2004), 2) transactional model (Rosenblatt, 1978), and 3) socioconitive model (Ruddell & Unrau, 2004a). The study was conducted in a Midwestern, suburban school over a 12-week time period with 443 fifth grade students. The repeated measures quasi-experimental research design allowed a quantitative investigation of online reading comprehension instruction to provide a reliable and valid assessment of the impact of online reading comprehension instruction

on changes in student performance on an established measure of online reading comprehension. Additional attention to common variables known to influence outcomes in reading and technology performance (e.g., demographic variables, prior reading achievement scores) strengthened the design by allowing a more refined analysis of the isolated impact from the instructional activities.

A regression analysis revealed prior achievement on norm-referenced measures of English/Language Arts as well as reported Internet use accounted for a significant amount of variance on online reading comprehension performance. Statistical analyses revealed significant differences between the experimental and control groups in online reading performance growth. Results from the subskill analysis show students in the experimental group demonstrated significant improvement over the control group on two of the three subskills (locating and synthesizing). No significant differences in group growth were observed for the Web evaluation task.

Findings from this study indicate teachers varying in experience and Internet familiarity can effectively teach online reading in a classroom setting, and that students who received this instruction developed these skills at a greater rate. This work can inform future efforts as to how to best teach the skills and strategies of online reading.

DEDICATION

First, I would like to express my deepest gratitude to my dissertation advisor, Dr. Jerrell Cassady, for supporting me throughout each step of my research and writing. I am grateful to you for holding me to such high standards, and it would have been next to impossible to accomplish this research without your support.

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To my parents, and my in-laws, thank you for the countless hours you helped parent my children while I was too often buried in my computer. To my young daughters, Alice and Audrey, I hope my ambition shows you your goals are always within reach and achievable with hard work and determination.

Most of all, to my husband, my number one support, thank you for your unwavering faith and confidence in my abilities. With each hurdle, you encouraged me and provided me with the spiritual and emotional guidance I needed to persevere. You have constantly helped me keep perspective on what is important in life and have sacrificed a great deal to help me attain this degree. I cannot thank you enough.

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CHAPTER I

INTRODUCTION TO THE STUDY

General Statement

Educational theorist, Marc Prensky, refers to today's students as digital natives, or "native speakers" of today's technology, who require learning environments that support their need to learn and think in technological terms (Prensky, 2001). Indeed, today's 21st century students are living in a world immersed with new forms of literacy. Cell phones, pagers, video games, e-mail, instant messaging, and online texts are common forms of entertainment and communication devices among students of this generation (Eagleton & Dobler, 2007). Although 100% of schools are now online with 97% of schools having access to instructional computers in every classroom (National Center for Education Statistics, 2008), students, ages eight through 18, are 57% more likely to go online at home than at school (Kaiser Family Foundation, 2010).

Many educators struggle to recognize the differences between today's students and students from past generations. Digital natives, or "native speakers" of today's technologies, require learning environments that support their need to learn and think in technological terms (Prensky, 2001). In a recent report released by the Kaiser Family Foundation (2010) children ages eight to 18, spend a total of seven hours and 38 minutes each day engaging with media, this jumps to ten hours and 45 minutes of total of media

content when accounting for the child's ability to multitask with multiple mediums. Specifically, students spend on average 62% of each day on a computer for entertainment purposes an increase of nine percent from 2004 (2010). Traditional approaches to literacy learning are not adequate for today's students (Coiro, 2003; Eagleton & Dobler, 2007; Leu, Reinking, et al., 2007), and students must become equipped with these 21st century skills to become effective citizens in our global community (Coiro, 2009a; Leu et al., 2008).

Statement of the Problem

Today we are living in a technology-driven society with access to a wealth of information at a moment's notice (Partnership for 21st Century Skills, 2009). Roughly 30% of the world's population is now connected online (Internet World stats: Usage and population statistics, 2010). Due to exponential growth of new technologies, Leu (2000) coins the term "deixis," meaning the pace of technology is continually changing (p. 745). The deictic quality of the Internet and instructional communication technologies (ICT) require teachers to reassess what it means to become literate (Leu, et al., 2004). New literacies do not replace the foundations of reading and writing; instead, new literacies build on existing skills including inferring, questioning, vocabulary, and writing to meet the demands of today's digital learners. Leu et al. (2004) states a New Literacies Perspective "assumes that proficient users of the Internet will also understand how to construct, design, manipulate, and upload their own information to add to the constantly growing and changing body of knowledge that defines the Internet" (p. 1595). While students undoubtedly enjoy using the Internet, electronic texts present new challenges for

today's learners (National Reading Panel, 2000; RAND Reading Research Study Group, 2002), and traditional methods of instruction are not sufficient (Coiro, 2003; Eagleton & Dobler, 2007; Leu, Zawilinski, et al., 2007).

All students do not have equal access to technology and the Internet, a factor that can amplify or impede learning. If all students including the disadvantaged have equal access, technology becomes a powerful tool that can heighten learning and decrease economic and social inequities (Warschauer, Knobel, & Stone, 2004). Research shows that students from high-income schools are more likely to use computers and the Internet for higher-order thinking compared to lower-income schools who engage in more "drill and practice" activities (Beckner, 2000; Valadez, 2007; Warschauer, et al., 2004).

Introducing technology in schools for simplistic uses actually intensifies the inequalities as disadvantaged children continue to fall behind their peers (Warschauer, et al., 2004). Preparing students for the demands information and communication technologies place on today's learner is of paramount importance. ICTs allows all students to experience literacy in ways once unimagined.

To support students and address curricular changes, DiBello (2005) recognizes the need for a strong commitment from all district parties including administrators, teachers, students, and parents. Schools need to invest in updated technology as well as teacher training and support (p. 240). Attention should also be given to the nature of learning in a technology-enhanced environment. School funding should address the social learning skills students need to succeed in today's society (Theodosakis, 2001). Even though funding in the past has mostly been given to programs that teach students to learn from technology, the constructivist approach (Piaget, 1952) of learning with

technology has the possibility to provide a greater benefit to today's students by enabling students to actively engage in meaningful understanding and discussion (Reeves, 1998). Students must have access to an environment that speaks their native language. Many teachers who use outdated methods of instruction, struggle to reach today's students who speak visually (Prensky, 2001).

The purpose of this study was to investigate the skills and strategies needed to become proficient in new literacies including (1) identifying important questions, (2) locating information, (3) critically evaluating the information, (4) synthesizing information from multiple sources, and then (5) communicating ideas to others" (Leu, et al., 2004). The term "new literacies" has been theoretically defined by various individuals (Gee, 2001; The New London Group, 1996; Lankshear & Knobel, 2008; Leu, et al., 2004). For this study, the term new literacies will credit Leu, Kinzer, Coiro, and Cammack's (2004) definition of instructional communication technologies (ICT) as "the skills, strategies, and dispositions necessary to successfully use and adapt to the rapidly changing information and communication technologies and contexts that continuously emerge in our world and influence all areas of our personal and professional lives" (p. 1572). This study looked specifically at the effect of online comprehension instruction on student performance and provides new resources and insights for educators interested in integrating new literacies into their existing curriculum.

New literacies skills are deictic, yet our educational systems are slow to change practice to meet the needs of today's learners. Because new literacies are often devalued in educational practice, students are having to engage in new literacies outside of the classroom. A lack of engagement, motivation, and connection between their world and

school results from this disconnect (New Media Consortium, 2010). Goodman (2003) recognizes a disconnect between home and school environments as schools often fail to recognize the media as the most influential factor in students today.

Major Research Questions

This online reading comprehension study took place over a period of eight consecutive weeks in ten 5th grade classrooms. During this study, students in the experimental group participated in 13 sessions teaching the new literacy skills of identifying questions, locating, evaluating, synthesizing, and communicating information in an online environment. A repeated quasi-experimental research design measured gains in reading comprehension as well predictors that influenced the obtainment of new literacies skills.

Research Question One (RQ1)

What are the relationships among student demographic variables and self-reported Internet use and Internet skills?

Hypothesis I: There will be a significant relationship between demographic variables and self-reported Internet use and Internet skills.

Research Question Two (RQ2)

Which variables best predict performance on an online reading comprehension assessment prior to program instruction?

Hypothesis II: There will be a significant relationship between demographic variables and prior reading achievement on norm-referenced measures of English/Language Arts and online reading performance.

Research Question Three (RQ3)

How do lessons on online reading strategies affect student performance on an online reading comprehension assessment?

Hypothesis III: Lessons in online reading strategies will significantly improve student performance on an online comprehension assessment.

Definition of Important Terms

Electronic Text: Any text found in electronic form

Informational and Communication Technologies (ICT): blogs, word processors, video editors, Internet browsers, Internet editors, e-mail, spreadsheets, presentation software, instant messaging, plug-ins for Internet resources, blogs, bulletin boards, avatars, virtual worlds, and many others (Leu, et al., 2004, p. 1571)

Internet: A vast computer network linking small networks including communication tools.

Literacy: The quality of being able to read and write any form of text.

Liquid Crystal Display (LCD): Liquid Crystal Display projector is a classroom tool that transmits light through a LCD screen and projects it for a larger image.

Nonlinear Hypertext: Internet text requiring readers to choose their own navigational path.

Web Literacy: The quality of being able to make sense of online text.

Significance of the Study

The skills and strategies to read online are multifaceted, and at times, exclusive to online environments (Afflerbach & Cho, 2007). A limited number of studies (Castek, 2008; Dwyer, 2010; Kuiper, 2007; Leu et al., 2005; Leu & Reinking, 2005) exist on the effects of teaching online reading proficiencies in classroom settings. Research suggests our youth struggle to complete online informational tasks (Eagleton & Dobler, 2007; Leu, Reinking, et al., 2007), and skilled students are resorting to traditional reading strategies while working with online texts when clearly, new skills and strategies are required (Coiro, 2007; Coiro & Dobler, 2007; Leu, et al., 2005).

A shift in literacy approaches requires measures that assess new literacies skills and drives instruction to meet the needs of our students. From these assessments educators can identify areas of concern and plan instruction accordingly (Castek & Coiro, 2010). This becomes challenging especially when considering new literacies skills are not required on state assessments, and the present No Child Left Behind (NCLB) legislation (U.S. Department of Education (DOE), 2002) fails to direct any attention to online reading comprehension (Coiro, Knobel, Lankshear, & Leu, 2008). Labeling reading exclusively as print-based will essentially deprive our students of becoming literate in today's society (Arellano-Osuna et al., 2009).

The scarce research does not deny the need for technology integration in today's classrooms. The Internet is clearly here to stay as higher education and today's workplace are dependent on ICTs and the Internet (P21, 2009). Teachers must accept the notion of changing classrooms and effectively teach online comprehension strategies to ensure today's students prosper in our 21st century (Coiro, 2003; Eagleton and Dobler,

2007; Leu et al., 2004). In addition to being knowledgeable about Web literacies, teachers need to feel comfortable implementing the vast resources of the Internet into the classroom (Sutherland-Smith, 2002; Wallace, 2004). The new literacies skills of questioning, locating, evaluation, synthesizing, and communicating information are critical for today's students, and must be included in today's curriculum. Specifically, how to best teach students new literacies must be examined.

Technology and its effects on reading achievement is an area in great need of further research (Castek, 2008; Coiro, 2009a; Coiro & Dobler, 2007; Leu, Zawilinski, et al., 2007). There is still much to learn about the skills and strategies needed to comprehend online texts. As technology continues to redefine literacy instruction, teachers will need both access and knowledge of today's technologies. Teachers need practical instructional research to improve online reading instruction (RAND, 2002), and there is a great need to examine the ways online literacy instruction can contribute to creating proficient users of ICTs. We are neglecting our students by not teaching 21st century literacies (Leu, Zawilinski, et al., 2007) and requiring assessments that measure online reading comprehension (Leu, et al., 2008). Educators must recognize the importance of online comprehension instruction to prepare today's students for the literacies of our future.

Basic Assumptions

Internet familiarity: It was assumed a variety of Internet familiarity levels among existed among the participating students.

Standardized administration of online literacy lessons: Teachers were provided with scripted lesson plans from the researcher, and it was assumed all participating teachers followed scripted lesson plans during the study.

Standardized administration of online reading assessments: There was an assumption that all teachers within the study administered the online reading assessment according to the standardized protocol.

Standardized offline comprehension scores: It is assumed that the norm-referenced measures of English/Language Arts achievement given on the Indiana Statewide Testing for Educational Progress-Plus (ISTEP+) and the Scholastic Reading Inventory (SRI) accurately represented the students' reading comprehension levels with traditional print.

Standardized online comprehension scores: It is assumed that the Online Reading Comprehension Assessment Elementary-Revised (ORCA Elementary-Revised) accurately represented the students' online reading comprehension abilities.

Basic Limitations

Access to computers: With one computer lab and one set of laptops in the school building, time with Internet access was limited, as computers were shared equally among the participating teachers/classes.

Length of Study: The 12-week length of study with eight weeks of strategy intervention instruction limited observable behavior.

Teacher Differences: Although the researcher provided scripted lesson plans for each lesson, teachers ultimately differed in teaching styles and presentation of content.

Summary of Chapter

This chapter has outlined the need for online reading comprehension instruction as well as advocated for our students' right to explicit teaching in new literacies skills. This quantitative study took place over a 12-week duration with eight continuous weeks of intervention lessons to examine the effects of online strategy instruction on a performance measure of online reading comprehension.

Chapter II consists of a review of literature pertinent to the study. Chapter III consists of an explanation of the methodology of the study. Chapter IV discusses the results of the study. Chapter V summarizes the study, discusses educational implications, and give recommendations for further study.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

This study explored the effect of online reading strategy instruction on a measure of online reading comprehension. This chapter first reviews the theoretical frameworks that support the nature of comprehension instruction in online environments. Second, an understanding of comprehension with traditional text and online text will be developed. A survey of the relevant literature concerning each of the skills and strategies needed to successfully comprehend online text follows. Last, a discussion of relevant studies and assessments in online reading comprehension is explored.

Theoretical Frameworks

According to Rosenblatt, a model is defined as “an abstraction, or a generalized pattern devised in order to think about a subject” (Rosenblatt, 2004, p. 1363). When considering the subject of electronic texts, past knowledge of reading comprehension models must be applied to this emerging topic. To frame a growing awareness of the processes underlying online reading comprehension, this chapter provides a review and analysis for Rosenblatt’s transactional model (Rosenblatt, 1978, 2004), Ruddell and

Unrau's sociocognitive model (Ruddell & Unrau, 2004a), and the new literacies perspective (Leu, et al., 2004), summarizing the domain of research for standard reading comprehension activities and extending that knowledge base to online reading environments.

Transactional Model of the Reading Process

As a well-known reader response theorist, Louise Rosenblatt developed a transactional model of reading comprehension from her extensive work in reading comprehension (1978). In this model, the *reader* and the *text* transact with the “transaction” being the reader's life experiences. Words are simply black marks on a page until the reader is able to transact with text to make meaning. Every reading act is a transaction; text implies meaning and meaning implies the use of text.

Rosenblatt recognizes an iceberg metaphor (Bates, 1979) where the tip of the iceberg, viewable to the public, represents the print or words of a text. The larger hidden bottom of the iceberg represents a reader's private linguistic reservoir. The linguistic reservoir encompasses the reader's life experiences. Within this private aspect, readers tap into their linguistic reservoir to draw on past accounts to make sense of text. A paradox exists as readers must interact between the tip and the reservoir, or the public and private aspects of text, to transact meaning (Rosenblatt, 2004, p. 1366). Students may need support, such as supportive scaffolds, to develop their linguistic reservoirs. Through purposeful dialogue and modeling, teachers can provide scaffolding to students and gradually decrease support as students become more independent (Rosenshine & Meister, 1994).

A reader approaches the chosen text with an *efferent* or *aesthetic* stance.

Rosenblatt (1978, 2004) contends the efferent stance involves reading for content. The reader approaches text with the goal of gaining specific knowledge. In contrast, an aesthetic stance involves the private part of the iceberg or the motivation behind reading. Readers approach text aesthetically when reading for enjoyment and create a lived experience with the text. However, one cannot assume the stance a reader takes with text. A reader can approach a text efferently or aesthetically most often experiencing both stances on a continuum switching back and forth between the two. Within both stances, the concept of a transaction is central (Rosenblatt, 1978, 2004).

During the reading process, the reader gains meaning through *evocation, response, and interpretation*. Evocation is the object of thought or meaning the reader is reacting to during the process of reading. During response, the reader reflects to the text using their linguistic reservoir to make meaning. Interpretation involves an evaluation of the text by internalizing the evocation. Rosenblatt recognizes different readers may interpret the same text, efferently or aesthetically, in multiple ways.

In more recent work, Rosenblatt (1998) discusses the shallow view of today's schools regarding literature as "a body of knowledge rather than of potential experiences" (p. 917). In our era of high stakes testing, Rosenblatt stresses concern for the need to raise literacy levels and develop critical literacy skills across the curriculum. Schools must promote and develop a reader's aesthetic stance within a reflective environment to help our children prosper in today's society (1998).

In sum, the transactional model has distinct components; however, those components blend together and disappear as the reader transacts with the text to make

meaning. The greater the lived experiences of the reader, the larger the linguistic reservoir, which will aid in the transaction between reader, text, and the meaning construction process.

Sociocognitive Model: The Reader, Teacher, Text and Classroom Context

Ruddell and Unrau's Sociocognitive Model of reading comprehension (2004a) contains three interactive components, 1) the reader, 2) the teacher, and 3) the text and classroom context. Although each component is equally dependent on others for the meaning construction process, each one is discussed in detail to provide significance and applicability of this comprehension model to online text.

To begin, the reader's interactions with the teacher, text, and classroom context aid in the meaning comprehension process. Some forms of the reader's knowledge are acquired in a deliberate and purposeful manner, while other forms of knowledge may not be consciously learned. The reader applies both *affective* and *cognitive* conditions to the comprehension process. Affective conditions relate to the reader's sense of purpose when encountering text. Motivation to read plays a crucial role in the reader's purpose. A reader's sociocultural values and beliefs also influence affective conditions as family, friends, peers, and the communities have profound effects on learning (Ruddell & Unrau, 2004a; Unrau & Ruddell, 1995).

The reader's cognitive conditions enhance descriptive, procedural, and conditional knowledge. Descriptive knowledge includes the facts a reader gains through text. Procedural knowledge identifies the "how to" strategies a reader employs during the reading process, and conditional knowledge is the "when" and "why" knowledge of text.

The role of schemata is central in the cognitive component of comprehension. Readers develop schemata at an early age from activities such as bedtime rituals and birthday parties developing memories the reader can apply to texts. When a reader encounters new texts, applying familiar schemata from personal or world knowledge helps the reader make inferences and summarize text content providing the reader with the cognitive knowledge needed for text comprehension.

The second component, the teacher, is parallel to the reader's components. The teacher is optimally viewed as warm, caring, and flexible, valuing the reader as an individual and as a part of the classroom community. Teachers also have high expectations for students. The teacher's affective and cognitive conditions relate directly to the comprehension process. The affective component involves the teacher's motivation for classroom instruction and motivation to engage readers. Ruddell and Unrau (2004b) describe these teachers as influential, intrinsically motivated, who promote literacy engagement by "stimulating intellectual curiosity, exploring students' self-understanding, using aesthetic imagery and expression, and focusing on problem solving" (p. 955).

The teacher's cognitive conditions involve declarative, procedural, and conditional knowledge. The teacher provides instructional knowledge, knowledge of metacognitive strategies, and knowledge of motivation in the classroom context to actively construct meaning in the classroom. Learning unfolds when students apply meaning through interaction with text and classmates. The teacher's personal and world knowledge can affect the cognitive conditions as well. Overall, the teacher is viewed as

an orchestrator of knowledge by aiding the reader's interaction with the text and classroom context.

The third component of this model is the text and classroom context. Reader engagement and interaction is directly linked to a reader's motivation to learn. Within the classroom context, the reader "reads" more than just the text. The reader must also read the social dynamics of the group, including the teacher, as well as discussions among peers in the classroom. Classroom discussions help readers gain new insights to text and develop a deeper understanding of material. Parent and community expectations additionally contribute to the classroom context (Ruddell & Unrau, 2004a).

In sum, the sociocognitive model can be viewed as three interconnected circles where each component is dependent upon the other in the meaning construction process. The social dynamics of the classroom is a critical component in providing an enriching context to support comprehension of text while expanding the literacy reservoir of the reader.

A New Literacies Perspective

An array of theoretical perspectives emerges when considering the term new literacies (Coiro, et al., 2008). Some view new literacies in terms of gaming technologies (Gee, 2008; Squire, 2008; Steinkuehler, 2008), as multimodal (Stein, 2008; Unsworth, 2008; Wyatt-Smith & Elkins, 2008), as critical literacy (Fabos, 2008), or consider literacy to be viewed as "multimedia" literacy incorporating both words and pictures (Mayer, 2008).

Perspectives from supporters of gaming technologies (Gee, 2008; Squire, 2008; Steinkuehler, 2008) advocate the potential of computers and video games in the classroom setting. Typically, educators take a negative stance towards gaming technologies and overlook the educational potential of these mediums (Gee, 2008). Gaming supporters argue wireless mobile devices and video games technologies teaching content should be brought into the school setting to increase motivation and enhance learning.

A multimodal perspective (Stein, 2008; Unsworth, 2008; Wyatt-Smith & Elkins, 2008) of literacy incorporates a variety of communication media/modes including sound, writing, speech, gestures, and images to connect visual, audio, and spatial aspects of learning in the comprehension process. With multimodality, new representations of communication can support the acquisition of critical literacy skills and deepen learning in online environments.

A critical literacy (Fabos, 2008) stance recognizes the political, economic, and social influences of online information and argues direct instruction is needed to critically evaluate and synthesize information in Web environments. Students must be able to distinguish objective from biased information as they are repeatedly faced with the persuasion of Internet commercialism when navigating the Web.

Mayer's (2008) view on multimedia literacy argues for an expanded definition of literacy to include both words and pictures. Specifically, students must be able to create and understand multimedia communications, which in turn, supports content acquisition. To support multimedia literacy, educators must work to incorporate today's media into

classroom settings to allow student production of multimedia to communicate and express information.

For the purpose of this study, the “new literacies perspective” will refer to Leu, Kinzer, Coiro, and Cammack’s (2004) definition which follows:

The new literacies of the Internet and other ICTs include the skills, strategies, and dispositions necessary to successfully use and adapt to the rapidly changing information and communication technologies and contexts that continuously emerge in our world and influence all areas of our personal and professional lives. These new literacies allow us to use the Internet and other ICTs to identify important questions, locate information, critically evaluate the usefulness of that information, synthesize information to answer those questions, and then communicate the answers to others (p.1572).

Identifying questions, locating information, evaluating, synthesizing, and communicating information with online information requires new skills and strategies as compared to the strategies needed for traditional text (Coiro & Dobler, 2007).

Coiro (2008, p. 14) established four characteristics of an emerging new literacies perspective. These four characteristics below help inform a new, richer understanding of what constitutes technological literacy in today’s society providing a foundation for the integration of new literacies skills in today’s classrooms

First, *new technologies for information and communication and new visions for their use require us to bring new potentials to literacy tasks that take place within these technologies.* Emerging ICTs necessitate a need for a change in practice to develop proficiencies. Teachers must embrace these technologies as a means to enhance motivation and deepen content learning.

Second, *new literacies are central to full civic, economic, and personal participation in a world community.* All students deserve an education that fully prepares

them for 21st century learning (New London Group, 2000). ICTs are becoming critical for literacy in our global society and indicate the need for new literacy skills for all students across all nations. Schools are failing to support students in their development of new literacies and online reading comprehension (Leu, Zawilinski, et al., 2007). Initiatives at the national, federal, and state level must join together to create a shared vision and develop technology competencies among all students.

Third, *new literacies are deictic; they rapidly change as defining technologies change*. The deictic nature of technology causes individuals to reexamine the term “new.” What is new today is likely to soon be outdated tomorrow (Leu, 2000) making the notion of “fully literate” in every technology unrealistic and unobtainable (Coiro, et al., 2008, p. 5). Indeed, most teachers, technologically speaking, will be less literate than their students. This shift in teacher to student relationships requires teachers to reevaluate their roles in online learning environments (Coiro, 2009a; Eagleton & Dobler, 2007). The deictic nature of technology is difficult for literacy instruction to match; however, we must adapt to the changes to prepare students for tomorrow’s demands (Leu, et al., 2004).

Last, *new literacies are multiple, multimodal, and multifaceted*. An examination of collective models of both historical and contemporary reading comprehension is needed to fully understand the complexity of the new literacies perspective. No one single viewpoint can adequately address this expanding framework. The definition of literacy must be expanded to include a variety of perspectives from a variety of research domains. Literacy is no longer solely based on print but rather new forms of communication including a multitude of constructs.

Integrating These Frameworks to Fit the Study

Together, an integration of the transactional model, sociocognitive model, and new literacies theory provide a theoretical basis for the foundation of this study. First, the transactional model provides insight into how a transaction with electronic texts can offer motivation, support, and social contexts to support reading comprehension. Electronic texts unlock new potentials for the transactional theory as readers are able to transact with text in ways once unimaginable. Words become interactive through color, hyperlinks, and animations all assisting a reader's transaction with text. Moreover, the transaction with electronic text can be responsive and adjustable as reading and writing become fused together in online environments (Leu, Zawilinski, et al., 2007). Second, the Sociocognitive model is as relevant and instructive to electronic texts as traditional reading materials. This model supports the social process, which contrasts greatly to traditional text. Online, social engagement lacks the face-to-face interaction including body language and vocal inflection, but in turn, promotes motivation and provides computer scaffold supports to enrich learning. An all-encompassing framework, which uses today's technology in social contexts to support student transactions with texts, lays the groundwork for effective lessons designed to support online reading comprehension acquisition. Last, the new literacies framework provides a contemporary model addressing the need for comprehension instruction in online environments. The perspective's characteristics of online literacy can be used to structure the development of curriculum teaching reading comprehension on the Internet and with other ICTs.

The next section addresses comprehension in both traditional and online environments. Following this comprehension discussion, an examination of specific

skills needed to comprehend online texts as well as measures of online assessments will be addressed.

Comprehension of Traditional Text

In this discussion of reading comprehension with traditional text, the proposed model of reading comprehension in the RAND Reading Report (2002) developed by the Reading Research Study Group (RRSG) is examined. This report was generated to address the most pressing issues in literacy. It sets a clear definition of reading comprehension as it relates to the reader, text, and activity. This report is organized around central issues facing practitioners and documents the areas of need in regards to future reading comprehension research.

To begin, the RAND Reading Report (2002) views the reading process as an interaction between the reader, the text, and the activity, all occurring within a broader sociocultural context. First, the *reader* brings specific expectations, cognitive capabilities, and purposes for reading. Second, *text* features are recognized as impacting the comprehension process. Last, the *activity* involves the purpose, operations, and outcomes for reading. All three components occur within a sociocultural context. Context can refer to both the classroom environment as well as the reader's cultural and home experiences.

The RAND reading report defines comprehension as “the process of extracting and constructing meaning through interaction and involvement with written language” (p. 11). Dolorous Durkin also recognized the need for an exact definition of comprehension in the 1970's. Her landmark study on comprehension instruction (1978) was a wake up

call to educators, administrators, and researchers. After hours and hours of classroom observations in grades three through six throughout the majority of a school year, Durkin discovered that comprehension instruction accounted for less than 2% of total instruction time. Teacher's manuals were exclusively used for both vocabulary instruction and story comprehension. Students were viewed as first "listeners" and second, "doers" in the classroom. Comprehension was not taken above a literal level as ditto sheets, related busy work, and classroom transitions filled instruction time.

Strong literacy skills are becoming a necessity, as fewer blue-collar jobs are available in today's society; yet, despite the need for strong literacy skills, high school reading scores have remained stagnant over the past 30 years (as cited in RAND, 2002, p. 5). All students now need advanced literacy skills as these skills are becoming a necessity to survive in today's society (Fleishchman, Hopstock, Pelczar, & Shelley, 2010). Many teachers have the misconception that children learn to read simply through exposure to books; however, reading is a complex process and students need specific strategies at all grade levels to become successful readers. Reading comprehension must be fostered and developed in the classroom setting for students to become proficient.

Comprehension Instruction of Traditional Text

Teachers who effectively integrate comprehension strategies into curriculum instruction enhance students' comprehension skills (Fielding & Pearson, 1994; National Reading Panel, 2000). Pressley (2002) recognized that reading is a complex process and therefore requires complex strategies. The RAND report (2002) confirms that good

readers require multiple strategies to derive meaning from text, and teachers who incorporate comprehension strategies in the classroom foster reading comprehension.

Afflerbach, Pearson, and Paris (2000) describe a lack of constancy between the terms *skill* and *strategy* in regards to reading practices. “Sometimes *skills* and *strategies* are used as synonyms, and sometimes they are used to describe complementary relations (e.g. strategies support skills) or a notion of developmental progressions (e.g. first the phonics skills then the comprehension strategies)” (p. 364). Historically, the term reading skills have been used in literature for the past 50 years. The term strategies, however, came about in the 1970’s to describe various aspects of information processing (e.g. chunking, rehearsal). Afflerbach, Pearson, and Paris (2008) define strategies as “deliberate, goal-directed attempts to control and modify the reader’s efforts to decode text” (p. 368). Skills, on the other hand, are the automatic processes of reading proficient readers demonstrate when engaging with text.

Duffy et al. (1987) recognized the value of direct strategy instruction through his landmark study with third grade students. Twenty third-grade teachers participated in a study designed to examine the effects of direct comprehension strategy instruction with low reading groups. Ten teachers in the experimental group were taught how to model the thought processes identified with reading skills and strategies. Results from this study were threefold. First, teachers could indeed explain complex cognitive skills to students and help them develop effective reading strategies. Second, explicit instruction supported both awareness of content and strategic thinking. Third, explicit strategy instruction improved student performance on one standardized subtest reading measure and one maintenance measure given five months after treatment. This study confirmed

naturalistic classroom conditions incorporating strategy instruction enhances reading performance over traditional decontextualized measures. Duffy's et al. (1987) study influenced classroom comprehension instruction as strategy instruction in the 1990's became an integral part of reading classrooms and is still included in programs today.

Knowing that reading comprehension can be improved with explicit instruction, Pressley and Afflerbach's (1995) analysis of over 40 think-alouds revealed that mature readers use a variety of strategies to comprehend text. Good readers activate prior knowledge (Anderson & Pearson, 1984), ask questions (Pearson, Roehler, Dole, & Duffy, 1990; Taboada & Guthrie, 2006), determine importance in text (Dole, Duffy, Roehler, & Pearson, 1991), and summarize information (Pearson, et al., 1990). Readers respond as they encounter and progress through text with the overall goal of meaning construction. To help developing learners transition to strong readers, teachers need to provide instruction, examples, and models that demonstrate how "good readers" construct meaning from text.

Consistent with this multifaceted instructional approach is Vygotsky's (1978) *zone of proximal development*, which is a fundamental aspect of the sociocultural learning model. Vygotsky's (1978) *zone of proximal development* is fundamental to supporting the comprehension process in students. Central to this concept is the understanding that instruction and learning are socially connected. Instruction is mediated by *scientific concepts* (curriculum content) connecting to the child to in turn become *everyday concepts*. The everyday concepts are developed through instruction within the zone of proximal development (Hedegaard, 1990). Teachers can offer scaffolds to guide students through strategies, helping students gain automatic use of

comprehension strategies. Cazden (1983) describes a scaffold as “a temporary framework for construction in progress” (p. 6). According to Saye and Brush (2002), two levels of scaffolding exist in the educational setting, soft scaffolds and hard scaffolds. Soft scaffolds are flexible supports teachers or students can administer through dialogue in the classroom. This type of scaffold is generally unplanned and used when an intervention is needed. On the contrary, hard scaffolds are static, planned in advanced, and can be embedded into instruction. Both hard and soft scaffolds, provided by the teacher or peer-to-peer, can assist students in their learning as they work toward independent proficiencies.

Harvey and Goudvis (2000) draw attention to teacher scaffolding in their text, *Strategies that Work*. They recommend a “Gradual Release of Responsibility” teaching model (Pearson & Gallagher, 1983) that incorporates the following four components: 1) teacher modeling, 2) guided practice, 3) independent practice, and 4) application in real context. This model allows students to gain more responsibility of the comprehension process with the goal of becoming fluent readers. The notion of guided practice (Fielding & Pearson, 1994; Pearson & Dole, 1987) provides the opportunity for collaboration and discussion in explicit comprehension instruction.

Teacher modeling is also a helpful tool in comprehension strategy instruction (Duffy, Roehler, & Herrmann, 1988; Fielding & Pearson, 1994; Rosenshine & Meister, 1994). The cognitive modeling process is grounded in the theory that teachers can verbally bring to surface their thoughts while reading a text so students in turn will internalize this behavior (Davey, 1983). Duffy’s et al. (1987) study showed that teacher modeling, followed by guided practice, resulted in greater comprehension gains for both

high and low ability readers. This study documented how teachers can learn to clearly and precisely model the cognitive processes while working with students.

A favorable and effective model to teaching comprehension strategies is the Reciprocal Teaching Model (Brown & Palincsar, 1989; Palincsar & Brown, 1984). The Reciprocal Teaching Model (RT) promotes engagement in reading as students share four common goals: predicting, question generating, summarizing, and clarifying. After a portion of text is read, one student (designated as a student leader) asks a question allowing classmates to respond. The leader then summarizes the group's response before classmates are again invited to participate in a flexible discussion of the text. Both adults and students can take on the role of the teacher where the "teacher's" responsibility is facilitating discussion in a collaborative environment. RT involves explicit teacher modeling to define and practice the four strategies. RT is not based solely on the acquisition of strategies, but rather the use of strategies to foster comprehension. Practicing these skills in a scaffolded environment supports the acquisition of strategies across multiple contexts and in multiple environments. The give-and-take between teachers and students produces a scaffolding support system. The balance between modeling, instruction, and guided practice provides the learners the experiences needed to independently implement comprehension strategies with text (Palincsar & Brown, 1986). Reciprocal teaching has been shown to be effective in content area instruction (Brown & Palincsar, 1985), and in small and large group settings (Palincsar & Brown, 1984). In their meta-analysis of 16 quantitative reciprocal teaching studies, Rosenshine and Meister (1994) found an effect size of .32 with standardized tests and an effect size

of .86 with experimenter-developed comprehension tests, indicating reciprocal teaching as a favorable method for strategy instruction.

Precise strategy instruction is necessary to progress students from beginning readers to fluent readers (RAND, 2002). Teaching explicit strategies through explanation, teacher modeling, and guided practice helps students understand the nature of reading and why strategy application is a critical part of reading fluency. Strategy instruction based on a gradual release of responsibility (Pearson & Gallagher, 1983) and reciprocal teaching (Rosenblatt, 1978) can frame comprehension instruction in online environments.

Comprehension of Online Text

The nature of reading must now be expanded to include digital environments. Merging our past knowledge of traditional print comprehension with rising research on new literacies creates a state of disequilibrium as we try to understand electronic texts (Dalton & Proctor, 2008). As new technologies are being developed, the fundamentals of comprehension documented in the RAND report can now serve as a framework for online texts. Coiro (2003) examined the RAND Reading Report as it relates specifically to instruction in open, online environments arguing that electronic texts pose important implications for comprehension instruction, professional development, and assessment. The RAND Report (2002) recognizes the need for research that shows a relationship among all three components of comprehension. A discussion of the three components, *text*, *activity*, and *reader*, as well as the *context* of learning, as it relates to electronic text will address how comprehension differs in online environments.

Features of *text* can greatly impact reading comprehension (RAND, 2002).

Dalton & Proctor (2008) recognize the need for an expanding definition of print text to include qualities of digital texts. The skills required to successfully comprehend online text differ from traditional texts. Electronic texts provide new purposes for the reader, new texts layouts to comprehend, and new approaches to text interactions. Although electronic texts share some of the same comprehension processes, they also introduce new complexities including nonlinear hypertext, multiple-media text, and interactive texts (Coiro, 2003; Coiro & Dobler, 2007). “To be adept at seeking, evaluation, and using information found on the Internet, readers must navigate through Internet text and apply their knowledge of the reading process” (Coiro, 2003, p. 83). With traditional texts, information is processed in a linear or vertical fashion. As students transition to electronic texts, the learning path becomes horizontal as hyperlinks take students across multiple Web sites.

According to the RAND Reading Report (2002) the *activity* of reading involves “one or more purposes, some operations to process the text at hand, and the consequences of performing the activity” (p. 15). The new purposes that the Internet introduces changes the activity of reading. Web-based inquiry projects are often motivating and engaging for today’s learner but require higher levels of thinking and problem solving skills that are not always associated with traditional print (Castek, 2008; Coiro, 2009a; Eagleton & Guinee, 2002; Kuiper, Volman, & Terwel, 2008). In addition to the purpose for reading, the operations for obtaining information on the Internet require new literacy proficiencies including “manipulating electronic databases, using multiple search engines, and navigating hierarchical subject guides” (Coiro, 2003, p. 461). Students

often approach the Internet with a “snatch and grab” philosophy (Sutherland-Smith, 2002, p. 664) with the expectation of finding information quickly and often prefer to seek information through browsing rather than strategic searching (Schacter, Chung, & Dorr, 1998). The consequences of reading on the Internet include increased motivation in meaningful activities (Coiro & Fogleman, in press). With the Internet, students can continue knowledge construction by communicating ideas to larger audiences (Coiro, 2003; Richardson, 2006). Clearly, the Internet expands our knowledge of the purpose, process, and consequences of reading to include new literacies skills.

Considering how electronic text impacts today’s *reader* is a critical component of online comprehension. Reading on the Internet creates greater demands on today’s students (Coiro, 2007; Fabos, 2008; Fidel et al., 1999; Kuiper, 2007; Schacter, et al., 1998; Sutherland-Smith, 2002). Electronic texts offer new supports for struggling readers. The Internet can become a possible teaching tool to support the comprehension process. Tools such as text-to-speech (TTS), hyperlinks to vocabulary, and multimedia presentations of web content offer digital literacy supports and scaffolds for low readers (Dalton & Proctor, 2008). Conversely, Internet environments offer numerous barriers. Even the most proficient readers can be confused, distracted, and overwhelmed by hypertexts, animations, and advertising seductions (Coiro, 2003; Hill & Hannafin, 1999; Kuhlthau, 1991, 1999). The reader must feel confident in his or her ability to read online texts to fully process and comprehend in this environment.

The three components of comprehension exist within a greater *sociocultural context*. The context of instruction must be expanded beyond the classroom when considering electronic texts. The consequences of social factors including the student’s

experiences in home and cultural environments directly connect to the context of learning (RAND, 2002) and in turn, affect reading comprehension. Availability of technology in both the home and school environment relates to the reader's context and plays a critical role in helping students learn new literacies skills. The context of learning also changes in open environments as students often collaborate with peers and communicate information to a larger audience (Eagleton, 1999; Eagleton & Dobler, 2007; Richardson, 2006).

Comprehension Instruction of Online Texts

To help students comprehend in open online environments, educators must once again turn their attention to the importance of developing and delivering quality reading comprehension strategy instruction (Castek, 2008; Coiro, et al., 2008). Several strategies for traditional print are similar to electronic text, and teachers must teach students to compare and contrast the differences (Coiro, 2009a). Qualitative data has confirmed that skilled readers use many of the same offline text strategies with online text (Coiro & Dobler, 2007) including activating prior knowledge, questioning, summarizing, and determining importance in text (Pressley & Afflerbach, 1995). However, findings also indicate reading online requires new strategies above and beyond what is needed for traditional print. With online texts, students needed new sources of prior knowledge, higher levels of inferential reasoning, and self-regulated navigation strategies (Coiro & Dobler, 2007).

Although reading traditional text requires similar strategies, Internet text contrasts to traditional print. With traditional texts, critical evaluation can involve questioning the

author's point of view, voice, and message (McLaughlin & DeVogd, 2004). On the Internet, information from all over the world is available at the click of a mouse. With more text variety, students need specific instruction on how to evaluate information on the Internet where anyone can author anything (Baildon & Baildon, 2008; Coiro, 2007; Coiro & Dobler, 2007; Fabos, 2008; Kuiper, et al., 2008; Leu, et al., 2005; Leu, et al., 2008; National Reading Panel, 2000). Students must first learn the rules of electronic environments and how to become critical of a Web site's content.

Pearson and Gallagher's (1983) Gradual Release of Responsibility Model can be applied to electronic texts; however, teachers must first understand the workings of the Internet which is challenging for teachers who themselves may be amateur users (Dalton & Proctor, 2008). Teachers must learn the new literacies skills to engage in the first component of the gradual release framework, teacher modeling. "Modeling how to use strategies flexibly to solve different comprehension tasks becomes even more important as technologies rapidly change and new forms of literacy emerge" (Coiro, 2003, p. 463). With electronic texts, teachers can model how good readers develop questions, use strategic search terms, evaluate the validity of web content, synthesize information within and across multiple sites, and communicate ideas through one of the many online tools such as wikis or blogs (Coiro, in press; Kymes, 2005). Then, through guided and independent practice, students can work towards proficiency with online text.

Coiro (in press, pp. 5-6) outlines a four-stage adjustable plan for think-aloud lessons with online text. First, teachers must model how to *approach online reading tasks* before beginning an online search. Inquiry on the Internet is used for one of two purposes: 1) to answer a question, or 2) to solve a problem (Leu, Zawilinski, et al., 2007).

Before beginning a navigational search, students need to focus their purpose to avoid inevitable distractions found in online environments.

Additionally, teachers must model how to *navigate and negotiate online texts*. This applies to reading search engines and implementing a variety of Web evaluation skills. Skilled readers are constantly making inferences before selecting hyperlinks (Coiro & Dobler, 2007), and students need to understand the thinking behind this complex process. Third, *monitoring comprehension of and pathways through online texts* can be modeled by teachers to show a variety of fix-up strategies readers can use to guide their understanding of online texts. Students need to understand when stopping and reflecting on content is appropriate for monitoring comprehension. Last, teachers must show students how to *respond to online texts*. Responding with online texts can be interactive in nature and modeling how to engage with these texts will support students' online literacy development.

One model to reading comprehension has been developed specifically for online texts. The *Internet Reciprocal Teaching Model* (IRT; Leu, et al., 2008) modified from Reciprocal Teaching (Brown & Palincsar, 1989; Palincsar & Brown, 1984) incorporates a gradual release of responsibility (Pearson & Gallagher, 1983) within Internet text. Informed by their research, IRT is adapted to accommodate a larger number of students typically found in diverse classroom settings. IRT involves the use of online texts, rather than traditional printed texts, and wireless laptop carts in the classroom setting. In addition, IRT is centered around individual texts rather than all students working within a common text. Although teacher modeling within the IRT framework occurs through the use of think-alouds and discussions, IRT stresses a shift to increased student modeling.

Valuing student experience and knowledge with technologies “encourages greater investment in classroom activities and increases their engagement with texts and the learning process generally” (p. 7).

The four original reciprocal strategies of predicting, questioning, clarifying, and summarizing are adjusted to represent the new literacies of questioning, locating, critically evaluating, synthesizing, and communicating strategies. A gradual release of responsibility to teach these strategies within a three-phase instructional framework provides a scaffold for students as they learn comprehension strategies necessary for online texts. Last, in the IRT model, students are encouraged to collaborate in purposeful conversations about the online reading comprehension process. The IRT model was implemented during a three-year research grant titled, Teaching Internet Comprehension to Adults (TICA) Project (Leu & Reinking, 2005). A detailed description of this study as well as the components of the three phases to IRT instruction is discussed in a future section of this chapter.

New Literacies to Support Online Reading Comprehension

This section acknowledges each of the five new literacies (Leu, et al., 2004) defined in the present study. Each will be discussed separately under the headings of a) identifying questions, b) searching for information, c) critical evaluation, d) synthesis, and e) communicating information. Strategies to support acquisition of these strategies will additionally be included within each heading.

Identifying Questions

Questioning is an important component of comprehension monitoring (Palincsar & Brown, 1984). In their review of questioning intervention studies, Rosenshine, Meister, and Chapman (1996) found teaching students how to develop questions has shown significant gains on comprehension measured by end of intervention assessment tests showing student-generated questions as an effective cognitive comprehension strategy.

In more recent work, Taboada and Guthrie's study (2006) with 3rd and 4th grade students confirmed student generated questions with traditional texts significantly impacted reading comprehension even after statistically controlling the variance for prior knowledge. This suggests reading initiated by a question has the ability to positively impact reading comprehension and that this process is not dependent on prior knowledge.

The ability to generate questions is central when working in online environments (Leu, et al., 2004) due to the fact online reading regularly begins with a question to ask or a problem to solve (Leu, Zawilinski, et al., 2007). In fact, students who self-generate research questions in online environments have increased motivation and increased success in the searching process (Kuiper, Volman, & Terwel, 2007; Kuiper, et al., 2008). Lyons, Hoffman, Krajcik, and Soloway (1997) found that simply providing students access to online environments did not prompt students to generate questions. Because students typically begin researching without formulating a question (Eagleton & Dobler, 2007), specific instruction is needed to support students with self-generating questions in online environments. Burke (2002) supports the need for question strategy instruction

and argues questioning is the most powerful tool in online reading. “No other tool will help the Internet reader as much as the right question, asked at the right time, and in the right way” (p. 38).

Dwyer (2010) included explicit instruction on developing self-generated questions in online environments throughout her longitudinal study with elementary students. Her findings provide three important insights into question strategy instruction with online text. First, children gained more conceptual knowledge and experienced higher levels of engagement and success with open (self-generated) questions. Second, students benefited from explicit strategy instruction in developing self-generated questions. She incorporated the theme, topic, focus area of questioning (Eagleton & Dobler, 2007) into her online strategy instruction as well as the Question Answer Relationship (QAR) Model (Raphael & Au, 2005) which she adapted to include both multisensory and kinesthetic components. Both of these models provided scaffolded support to teach students how to generate open questions. Third, prior domain knowledge significantly contributed to higher-level questioning. Qualitative analysis suggested students who had a greater amount of prior knowledge during the second phase of the study used more sophisticated vocabulary and asked more conceptually challenging questions.

Implications from research support the significance of self-generated questioning in online environments. Students need support and guidance to develop this strategy (Burke, 2002; Dwyer, 2010; Eagleton & Dobler, 2007; Kuiper & Volman, 2005; Kuiper, et al., 2007; Leu, Zawilinski, et al., 2007; Lyons, et al., 1997).

Searching for information

Nearly half of all Internet users utilize a search engine on a typical day (Pew Internet & American Life Project, 2008). Searching skills are of paramount importance to online reading (International ICT Literacy Panel, 2001). In fact, Henry (2006) refers to searching the Internet as a “gatekeeper” causing students who are unable to locate information to get locked out of the searching process (p. 616). Schools must teach students basic searching proficiencies to address this complex skill. Online searching is a critical component to online comprehension and those who do not possess these skills will ultimately fall behind (Eagleton & Guinee, 2002; Hargittai, 2004; Henry, 2006; Sutherland-Smith, 2002). Searching the Internet furthermore requires new comprehension skills to become engaged and proficient with ICTs; yet, students, despite their tech savvy image, do not possess these skills (Bilal, 2000; Bowler, Large, & Rejskind, 2001; Broch, 2006; Hirsh, 1999).

Research shows that students enjoy searching the web (Bilal, 1999; Fidel, et al., 1999; Hirsh, 1999; Kafi & Bates, 1997), prefer graphics over the text (Fidel, et al., 1999), and expect to find information fast (Griffiths & Brophy, 2005; Kuiper & Volman, 2005; Sutherland-Smith, 2002). Yet, students struggle to generate search strings (Bilal, 2000; Bowler, et al., 2001; Fidel, et al., 1999; Wallace & Kupperman, 1997), do not look beyond the first few hits on a search query (Druin et al., 2009; Hill & Hannafin, 1999; Large & Beheshti, 2000), and become easily distracted, frustrated, or anxious when searching for information (Hill & Hannafin, 1999; Kuhlthau, 1991, 1999; Kuiper, 2007). To address this issue, Kuhlthau (1999) developed the “uncertainty principle” defining the

uncertainty in information seeking as a cognitive state that heightens anxiety and decreases confidence.

Kuiper's (2008) study with 5th grade students confirmed students are often impulsive Web searchers who easily get lost in the searching process. Student in this study typically engaged in little to no planning of search strings and lacked the patience necessary to sort through Web information. Similarly, Wallace and Kupperman's (1997) study with 6th grade science students supports the notion that students lack searching proficiencies. Students were reported as passive searchers simply content with getting the task completed, paying little to no attention to the quality of information retrieved.

In addition to feeling overwhelmed with search results, students do not possess the next steps needed to read text found from the searching process (Wallace, Kupperman, & Soloway, 2000). Instead, students prefer simply to browse (Large & Beheshti, 2000) and most frequently searched by scrolling, rather than reading, through information (Cromley & Azevedo, 2009).

Guinee, Eagleton, and Hall (2003) found both middle and high school students exhibit three approaches for locating information on the Internet. First, is the *.com approach* where students simply type in the subject followed by .com in the address bar. Second, is the *shopping mall approach*. With the shopping mall approach, students purposely select the Web sites they feel would best suite their searching needs. Last, is the *search engine approach* where students type in search terms in the search box of a given Web site. Furthermore, Guinee and Eagleton recognized students often engaged in a "click and look" strategy by simply progressing through the search results in a linear order hoping to find relevant and visually appealing information (2003).

Eagleton and Dobler (2007) suggest students use either a random strategy (haphazardly selecting a link), numerical strategy (progressing in a linear fashion), or judicious strategy (using the descriptions to make the best selection) to justify their search selections. These findings raise an important question relevant to this study: *What are the skills and strategies students need to effectively search in online environments?*

Leu, Zawilinski et al. (2007) suggests students must know how to use a search engine, read search results, read a Web page, and make inferences about the path of hyperlinks. Coiro (2005) recognized four challenges with supporting strategies to prevent unproductive Internet surfing. Two of these strategies relate directly to the searching process. First, students need strategies on evaluating search results to choose the best link. One way to teach this strategy is by printing out a search engine query for students to evaluate on paper. Using paper instead of an online environment prevents students from becoming distracted with the abundance of hyperlinks. Second, students need to know how to navigate within a Web site. To teach this strategy, the teacher could model effective steps to preview a Web site using a think-aloud method. These strategies can help support students in their quest to become proficient with online searching.

A second question, *What factors contribute to successful online searching?* is brought to surface when considering the searching process. Research suggests the role of prior experience influences successful searching (Hill & Hannafin, 1999; Lien, 2000). Hirsh (1999) found that the cognitive overload with the searching process is high for all but the most experienced searchers. Tu, Shih, and Tsai (2008) reported 8th grade students who were more experienced with the Web could more easily locate answers in close-ended (fixed answer) search tasks. With prior experience, students may become more

productive in the searching process.

A second factor found for successful online searching is the ability to make inferences. Successful online readers navigate text through an individual path constantly making inferences about hyperlinks along the way (Castek, 2008; Coiro & Dobler, 2007; Henry, 2006; Sutherland-Smith, 2002). Thirdly, the role of prior knowledge has been shown as a significant factor to significantly impact searching strategies (Fidel, et al., 1999; Guinee, et al., 2003; Hidi, 1990; Hill & Hannafin, 1999). Lawless, Schrader, and Mayall (2007) found that college students with a higher degree of prior knowledge utilized Web resources such as menus, hyperlinks, and graphics more than students with less prior knowledge on the search subject. Cromley and Azevedo's (2009) study with equal participants in 7th, 9th, and undergraduate school showed students with a greater degree of prior knowledge were more successful with locating information in hypermedia environments.

Last, Lazonder (2005) studied the effect of peer-to-peer collaboration in the search process. His results indicate that students who work in pairs used a greater variety of search strategies and were more accomplished in monitoring and evaluating their searching strategies compared to students who worked alone.

In sum, research suggests that students in general are often poor searchers with online text. Specific instruction on how to use effective search strategies, increase experience, build prior knowledge, and work collaboratively in online environments needs to be incorporated into classroom pedagogies. Students need precise skills and strategies to become effective Internet searchers (Bilal, 1999, 2000; Hill & Hannafin, 1999; Tsai & Tsai, 2003).

Critical Evaluation

Critical evaluation is a central component to online reading (Leu, et al., 2004) and especially important in an environment which allows anyone to publish any material at will (Leu, et al., 2008; Tilman, 2003, March). Online information is more diverse, (Tilman, 2003, March) and content regulations with Internet text are not always enforced (Harris, 2008). The American Association for Librarians (2003) argues all students need critical skills as a necessity to become informational literate in the 21st century. Furthermore, the International Society for Technology in Education (2007) sets a standard requiring students to implement critical thinking skills in the research process using appropriate digital resources.

Critical thinking in online environments requires more than simple web page evaluation or search engine comparison (Jones, 1996). Students are often misled by the Web site's visual appeal (Fidel, et al., 1999; Guinee, et al., 2003; Hirsh, 1999) and overcome by the marketing and commercial aspects (Fabos, 2008). Research confirms students lack the skills necessary to critically evaluate Web content (Castek, 2008; Fidel, et al., 1999; Kuiper, et al., 2007; Schacter, et al., 1998). Students typically believe anything published on the Internet must be considered valid and reliable (Hirsh, 1999; Large & Beheshti, 2000; Leu, Reinking, et al., 2007; Schacter, et al., 1998), and rarely inquire about the Web site's credential (Fabos, 2008; Hirsh, 1999; Wallace, et al., 2000).

In their study with approximately 50 7th grade students, Leu, Reinking, et al. (2007) found that high achieving online readers were not able to recognize a hoax Web site, *Save the Pacific Northwest Tree Octopus* (<http://zapatopi.net/treeoctopus/>). In fact, 87.5% of students believed this site was a genuine site and argued their viewpoint even

after the site was shown to be a spoof. Based on the issues addressed in this study, establishing a “healthy skepticism” is recommended when engaging with Internet texts (2007).

Students need to be taught specifically how to critically evaluate online information (Castek, 2008; Fabos, 2008; Kuiper, et al., 2007; Leu, Reinking, et al., 2007). Corio (2005) recommends having students ask themselves *How do I know this is true?* (p. 33). To answer this question in the classroom setting, teachers can model the uncertainty one might feel when evaluating a Web site. Her “think and check” strategy asks the following questions: 1) Does this information make sense?, 2) Where else can I look?, 3) Who created the Web site and why?, 4) Who is the author?, and 5) Who is linking to the site? (p. 34). This reading activity forces students to think critically and question content before assuming it is trustworthy information.

Direct instruction with online texts has been shown to increase critical evaluation in students. Hobbs and Frost (2003) for example found that 11th grade students with direct media literacy instruction could more accurately identify purpose, audience, and point of view with print, audio, and visual texts. Furthermore, Kafi and Bates (1997) found direct instruction improved critical evaluation skills with 6th grade students. Additional studies (Dwyer, 2010; Hirsh, 1999) suggest prior knowledge improves critical evaluation skills in online environments; however, students often lack this knowledge to assess online information (Fidel, et al., 1999) and need to have the ability to acknowledge predispositions in Web environments without relying on prior knowledge (Fabos, 2008). Thirdly, Hofman, Wu, Krajcik, and Soloway (2003) found students who were highly

engaged in subject matter were more thorough in browsing information and evaluating the Web site's content.

Collectively speaking, past research suggests direct instruction, prior knowledge, and engagement with online text are needed to help students learn the difficult process of critical evaluation. This study explores the issue of how best to teach critical evaluation in classroom settings.

Synthesis

The act of synthesizing online requires readers to sort through multiple Web sites, filter out relevant information, and then combine ideas to form a new representation that accurately portrays the answer or significance of the search. Although the act of synthesis is an essential component of online reading (Jones, 1996), it is perhaps the most difficult to examine due to the fact that synthesis in itself is an internal process (Leu, Zawilinski, et al., 2007). Reading Internet texts is a self-constructed process where no two readers will have the same experience. Fluctuations in text length, genre, and difficulty impact the cognitive skills needed to summarize (Hidi & Anderson, 1986) which in turn, affects the dynamics of synthesis. Synthesizing on the Internet presents new difficulties as readers are able to navigate individual paths through a multitude of text (Castek, 2008; Coiro & Dobler, 2007; Kuiper & Volman, 2005) constantly evaluating and summarizing along the way (Eagleton & Guinee, 2002).

Wallace et al. (2000) found students search the Web to find explicit answers rather than reading to understand content. Students were not able develop an answer to their online question based on a synthesis of information from multiple sites. Wallace and Kupperman (1997) confirmed the same tendency with 6th grade students as 76% of

total task time was spent searching leaving only 24% of time reading Web site content. Eagleton and Dobler (2007) refer to online searching as “one stop shopping” (p. 199) where students mistakenly believe that one Web site contains all the answers. This becomes an unfortunate circumstance as Web sites may potentially be biased and contain false information. When students are able to locate relevant information, another challenge surfaces. Students now have to use the located information in a meaningful way to pursue their task goals (Kuiper & Volman, 2005).

Dwyer (2010) found students in her study had difficulty summarizing information online and made little effort to restate content in their own words. Students in the 3rd/4th grade class experienced greater difficulty summarizing online text compared to the 5th/6th grade class suggesting experience plays a role in summarizing ability. When summarizing, students would typically copy the majority of information from the Web site verbatim and exclude the information they deemed unimportant. Similarly, this has been shown with traditional text. Hidi and Anderson (1986) found students up to 6th grade copy text details without conveying meaning to the central idea. Electronic texts can make copying information effortless (Eagleton & Dobler, 2007), which is a problem teachers need to address when teaching students to synthesize online material.

While studies have developed instruments that measure synthesis as a component of online reading comprehension (Coiro, 2007; Henry, 2007; Leu, et al., 2005; Leu & Reinking, 2005), only two studies to date have measured the effect of summary/synthesis strategy instruction in online environments. Castek (2008) found students who received online strategy instruction, including synthesis instruction, performed better on a specific task within her online reading comprehension measure that involved synthesis between

two sources of online text. Students in the experimental group scored significantly higher on this task when compared to the control group. Dwyer (2010), as previously discussed, found students continued to be haphazard and lacked proficiencies of summarization skills even after instruction and practice. Clearly, there is a great need for research to further explore how to best teach students to synthesize when engaging with online text.

Communication

Online text offers the ability to interact and communicate in ways once unimaginable. Communication tools such as blogs, wikis, discussion boards, chats, instant messaging, and video conferencing open up new possibilities for today's students, and with each of these new tools comes new strategies to learn (Leu, Zawilinski, et al., 2007). However, Lewis and Fabos (2005) argue "the change in literacy practices is more significant than the change in literacy tools" (p. 496). To fully communicate in online environments, readers must engage in an interactive process of posing and answering questions (Coiro, 2007).

Engaging in social media such from blogging to social networking sites is common practice for today's teenagers. In fact, 64% of today's teens have participated in some form of content creation on the Web (Pew Internet & American Life Project, 2007). The Internet provides a place today's youth can share, collaborate, and create new forms of literacy. It allows our society to feel a sense of connectedness, and for today's youth, who are accustomed to these technologies, this can seem almost instinctive (New Media Consortium, 2007). Today's communication technologies motivate students to write for an larger audience, not just the classroom teacher (Castek, 2008). For instance, when using blogs in the classroom, Witte (2007) confirmed that even her most reluctant 8th

grade students were spending significant time outside of the school day engaged in authoring blog posts.

Lin et al. (1999) asserts that students must continuously reflect on their thinking and new technologies have the potential to support student reflection. In her study, Kuteeva (2010) reported the use of wikis in an English classroom supported writing for both an academic and professional purpose. Students were indeed aware of a sense of audience, focusing on both grammatical and structural properties of text. Additionally, (Hoadley, 2000) found online discussion boards with middle school students contributed to gains in subject knowledge.

Communicating in online environments requires new strategies for effective use (Leu, et al., 2005). Consequently, online communication can lead to a greater awareness of audience (Greenhow & Robelia, 2009; Kuteeva, 2010), provide meaningful exchanges, develop social identities, and establish one's voice as a writer (Lewis & Fabos, 2005). The International Society for Technology in Education (2007) suggests students must use digital environments for both communication and collaboration. This study incorporates communication technologies in classroom environments to both engage and support reading comprehension with online texts.

Integrating New Literacies to Fit the Study

In sum, this section has explored the skills and strategies needed to comprehend texts in online environments. Consideration must be given to the effect of strategy instruction on online reading comprehension. Research suggests students need explicit teaching on how to generate questions, navigate through online text, evaluate Web

content, synthesize across multiple Web sites, and communicate ideas to a larger audience. This study examines the impact of strategy instruction on student performance on a measure of online reading. The next section reviews studies of relevance in online reading comprehension instruction.

Review of Studies in Online Reading Comprehension

Little is known about a reader's characteristics with online texts. In their review of four leading literacy journals, only 5.2% of articles published from 1997-2005 addressed technology (Palincsar & Dalton, 2005). In addition, the majority of existing Internet studies centralize around particular Internet tasks rather than examining online reading as a theoretical framework (Coiro, 2007). Emerging work is beginning to examine how online strategy intervention instruction affects comprehension with electronic texts (Castek, 2008; Coiro, 2007; Dwyer, 2010; Leu, et al., 2005; Leu & Reinking, 2005). Two relevant presumptions exist within these studies. First, within grades 5-12, gains in online reading comprehension were recognized after specific strategy instruction occurred, and second, specific teacher modeling was incorporated into instruction that promoted collaborative learning and inquiry tasks.

An examination of emerging research relevant to the importance of online strategy instruction will provide insights into best practices for online comprehension lesson development. Studies exploring student acquisition of online skills and strategies will be individually examined.

Kuiper (2007, 2008) involved four 5th grade teachers in eight weekly sessions centered around the topic of healthy food. Students engaged in Web searching, reading,

and evaluation skills. A teacher's manual with scripted lesson plans was provided to each participating teacher. Lessons focused on collaboration and discussion between students. Data including interviews, lesson observations, student questionnaires, and student assignments were analyzed. Results from this study confirm a gain in content knowledge from all participating classes, and a gain in Web literacy skills in all but one participating class. Despite these gains, students showed inconsistencies and engaged in passive, inflexible Web behavior. Teaching styles additionally played a role as the intensity of instruction varied from classroom to classroom. Implications from this study indicate students' school Web behavior simply mirrors home Web behavior. Although they gained new knowledge of searching the Web, students from this study did not act upon this knowledge. A second implication suggests curriculum be taught within inquiry activities where content and web skills are simultaneously embedded into instruction.

Castek's (2008) work with 4th and 5th grade students recognized the need to challenge students with Internet inquiry learning tasks integrated into content-area instruction. Furthermore, Castek recognized the role of the teacher changed as students swiftly took control and responsibility for their learning. Without significant differences among the control and experimental group at the outset of the study, students in the experimental group performed significantly higher than the control group on a measure of online reading comprehension. Specific gains were noted in three of the five new literacies including searching, synthesizing, and communicating. However, two tasks involving higher-level critical evaluation skills, found no significant differences between the two groups. Suggestions from these finding can raise several conclusions pertinent to online comprehension strategy instruction. First, teachers themselves do not need to be

considered accomplished in teaching new literacy skills for students to achieve gains in online reading comprehension. Second, students who receive online reading comprehension instruction experienced greater success implementing the new skills and strategies of ICTs . Third, an environment with high levels of student collaboration and student independence is necessary for effective online instruction. “It appeared students took less of an ownership role over what the teacher modeled than they did when they solved their own problem independently” (p. 181). Last, students need more support with higher-level critical evaluation skills to assess and determine the accuracy of information found in online environments. Results from this study indicate these higher-level skills are difficult to acquire and more explicit, direct instruction from the teacher may be needed to increase proficiency in this area.

Dwyer (2010) conducted a longitudinal intervention study with 3rd and 5th grade students as they transitioned to 4th and 6th grade respectfully over an 18-month time period at a disadvantaged school in Ireland. She crafted a series of eight Internet workshops framed around the new literacies perspective of online reading comprehension (Leu, et al., 2004). The tasks were integrated connecting the Internet to science and literacy and became progressively more difficult throughout the duration of the study. Additionally, the tasks integrated assigned reciprocal roles used within peer-to-peer collaboration. Similar to Castek’s (2008) study, Dwyer recognized the shift in the role of the teacher from a transmitter to a co-instructor as well as the observation of students actively participating in collaborative learning. Through a gradual release of responsibility model (Fielding & Pearson, 1994) students engaged in whole group,

guided practice, and independent practice. Peer-to-peer scaffolding was critical during guided practice allowing students to develop online comprehension skills.

Explicit strategy instruction was central to supporting students in online comprehension. Dwyer recognizes the nature of the question impacts the Internet behavior of the students. Closed questions such as *What types of items can be recycled?* resulted in less engagement when compared to higher-level questions such as *Describe how recycling can have a positive impact on our environment.* Higher levels of engagement also stemmed from questions that were self-generated from students. Analysis of transcripts and online video capture software (see <http://www.techsmith.com/camtasia>) indicated a significant difference in both the quantity and quality of time spent on open-ended questions as compared to closed questions.

Additionally, findings suggest a greater need to engage prior knowledge when working with online texts as compared to traditional texts. Prior knowledge acquisition as a prequel to workshop lessons impacted student competence with searching, predicting, determining importance, and locating information in online environments. It is also important to note students needed explicit instruction on how to connect with prior knowledge in online environments. Further findings in strategy instruction confirm students showed growth in their ability to self-regulate strategy use; however, students struggled specifically with their ability to summarize and critically evaluate information in online environments.

The Teaching Internet Comprehension to Adults (TICA) project (Leu & Reinking, 2005) three-year research grant addressed the following question: *Which skills*

and strategies appear to be important for successful online reading comprehension?

Think-aloud and verbal protocol analysis with 53 high ability online readers (7th grade) from two disadvantaged school districts were analyzed to determine patterns among these participants. Year two of the grant implemented a formative experiment of Internet Reciprocal Teaching (IRT) Model based on Palinscar and Brown's Reciprocal Teaching Model (Palinscar & Brown, 1984, 1986). The IRT Model was used to determine the best instructional methods for teaching online reading comprehension to a diverse population of students. Within the analysis of this formative experiment, two distinct patterns emerged (Leu, et al., 2008). Each pattern will be examined to support and frame online comprehension instruction within the IRT Model.

The first pattern, *Internet Reciprocal Teaching Progresses Through Three Phases of Online Reading Instruction*, breaks down instruction into three distinct phases. During phase one, the teacher leads instruction through explicit teacher modeling and think-aloud demonstrations. Lessons are based on the basic skills of handling and working with the Internet that serve as gateway skills to reading comprehension. During phase two, students work collaboratively to complete Internet tasks. Whole class instruction is minimal as students are engaging in new literacies by discussing and exchanging ideas. Essential to this phase is spending time at the end of each lesson discussing and sharing gained insights. Tasks during this phase gradually become less structured and increase in difficulty allowing students to gain independence develop online proficiencies. Within phase three, Inquiry, students begin to develop questions and research problems independently. The teacher becomes a "guide on the side" (Bruner, 1962) encouraging students to apply strategies taught in previous lessons. "It is at this point that students

develop an understanding of how important it is to play an active role in their own learning about the curriculum and experience firsthand the satisfaction associated with knowing how to question, locate, evaluate, synthesize, and communicate information with the Internet” (Leu, et al., 2008, p. 9). Essential to the Reciprocal Teaching Model, instruction within these three phases followed a gradual release of responsibility (Palincsar & Brown, 1984, 1986).

The second pattern, *Internet Reciprocal Teaching Progresses From Simpler to More Complex Online Reading Comprehension Tasks*, shows a progression from simple tasks similar to offline reading comprehension to complex tasks found solely in Internet environments. Students first gained proficiencies in locating information before evaluating and synthesizing across multiple Web sites. Then, students worked with communication technologies, such as blogs and wikis, to accurately express ideas to an appropriate audience. Again, discussion between students provided opportunities for students to collaborate and explore the new strategies of online reading comprehension.

Checklists of skills were used to document competence as students moved between phases of the IRT Model. Along with an investigation of how students acquire new literacy skills, year three of this study sought to measure online proficiencies of the IRT Model using a variety of online reading comprehension instruments. The next section provides an overview of the performance-based assessments that have been developed to measure comprehension in online environments.

Online Reading Comprehension Assessment

There is a great need to provide students opportunities to connect traditional reading strategies for offline print to online environments. Assessments involving both online process (searching behaviors) as well as online products (written responses) are necessary to evaluate online reading comprehension. Despite the promising opportunities to assess comprehension with Internet text, assessment measures can be challenging due to the inconsistent nature of online texts, time constraints within the classroom, and the time consuming nature of scoring these measures (Coiro, 2009a).

This section examines several performance-based assessments centered around the new literacies perspective (Leu, et al., 2004) and concludes with a detailed description of the Online Reading Comprehension Assessment-Elementary (ORCA-Elementary). This study measures online reading comprehension ability using a slightly modified version of the ORCA-Elementary. An understanding past ORCA measures as well as the specific components of the ORCA-Elementary is needed to provide a background of the assessment measure incorporated into this research.

Online Reading Comprehension Performance-Based Assessments

Performance-based assessments of reading comprehension in open, networked environments are now beginning to emerge (Castek, 2008; Coiro, 2007; Leu, et al., 2005; Leu & Reinking, 2005; New Literacies Research Team, 2005). A number of online reading comprehension (ORCA) assessments have come into view as a result of the work conducted by the New Literacies Research Team (2005). ORCA performance-based measures including the ORCA-Blog (New Literacies Research Team, 2005), ORCA-

Instant Message (New Literacies Research Team, 2005), ORCA-Iditarod (Leu & Reinking, 2005), ORCA Scenarios I and II (Coiro, 2007), and the ORCA-Elementary (Castek, 2008) take students through a series of online information tasks incorporating a variety of Internet resources. Rubrics for each Internet task evaluate students on their ability to 1) search, 2) locate, 3) evaluate, 4) synthesize, and 5) communicate information.

The initial ORCA assessments including the ORCA-Blog and ORCA-Instant Message were designed around middle-school topics and written for a 7th grade population. Both assessments were developed, piloted, and revised to investigate the new skills and strategies students need to implement when learning science content in a Web-based environment. Results show 12 weeks of strategy instruction contributed to a significant difference in scores when comparing the Internet immersed groups to the control group. Both the ORCA-IM and the ORCA-Blog established internal psychometric properties, internal consistency, and test-retest reliability making these instruments a possible tool for educators to assess online reading comprehension (New Literacies Research Team, 2005).

A third additional performance-based measure titled, *ORCA-Iditarod* was developed by the TICA research team during years two and three of the TICA grant. This Internet treasure hunt successfully measured a larger population of 7th grade students within a shorter (40 minute) time frame. Additionally, this assessment succeeded to incorporate the new literacies skill of critical evaluation. Psychometric properties from this measure indicate adequate internal consistency and inter-rater reliability (Coiro, Castek, & Henry, 2007; Leu & Reinking, 2005).

Based on these initial assessments, Coiro (2007) developed a similar assessment to both quantitatively investigate the new skills and strategies needed to comprehend online text and qualitatively examine the nature of online reading comprehension. The purpose of this study was to examine the new literacies required for adolescent readers to comprehend information on the Internet. One hundred and nine 7th grade students completed parallel measures (pretest and posttest) of an online reading comprehension assessment during this 16-week study. In addition, retrospective think aloud sessions from three selected students (high, medium, and a low reader), were qualitatively examined to tap into the nature of online reading comprehension strategies. This mixed methods research design aimed to show convergence between qualitative and quantitative methods providing insight into a created model to assess reading comprehension as well as examine how three students of varying abilities think through the online comprehension process.

Coiro's (2007) instrument involved two parallel measures of online reading comprehension (ORCA Scenario I & ORCA Scenario II). These measures were used in earlier pilot studies and were developed based on a new literacies theory (Leu, et al., 2004). To examine the results quantitatively, a factor analysis showed the first measure of reading comprehension (ORCA Scenario I) did predict a second, parallel measure of reading comprehension (ORCA Scenario II) above and beyond offline reading comprehension and prior knowledge. A hierarchical regression analysis indicated higher levels of topic-specific prior knowledge may improve performance for students with lower levels of online reading compression skills.

Online Reading Comprehension Assessment (ORCA)-Elementary

For this study, the ORCA-Elementary (Castek, 2008) was slightly modified and used with a population of 5th grade students to measure online comprehension. A detailed description of this measure and its components will be given as this measure best fits the needs of this study.

As a former member of the New Literacies Team, Castek developed an online reading comprehension measure for a younger population of students. Her ORCA measure titled, *ORCA-Elementary* assessed online reading comprehension with 4th and 5th grade students through five tasks posed as informational problems. Each of the five tasks incorporated a variety of new literacy skills requiring students to ask questions, search, critically evaluate, synthesize, and communicate information.

Student responses for the ORCA-Elementary were posted on a secure discussion board, and performance was assessed using specially designed rubrics evaluating online competencies within each task. Prior to administration, the ORCA-Elementary was piloted and refined to establish validity. Interrater reliability was calculated using Cohen's Kappa at .70, and internal consistency among the task items was calculated at .790 using Cronbach's alpha statistic. An expert panel review, instrument pilot, and iterative revision process was implemented to establish the assessment's validity. The ORCA-Elementary was shown as both a valid and reliable instrument for her population of students.

With no significant differences between the experimental and control group at the outset of the study, three tasks (task 1, task 3, and task 5) representing the skills of searching, synthesis, and communication, revealed significant differences from pretest to

posttest between the two groups. Task two and task four involving critical evaluation showed no significant differences. As mentioned previously, there is a great need to more explicitly teach and model higher-level critical evaluation skills with online texts.

Summary of Chapter

In sum, future skilled readers of online text will need to feel confident in the Internet comprehension process. Strategies designed specifically for online texts can help readers gain confidence and a greater sense of self-efficacy when reading in open environments. To become literate in today's technology-driven society, students must be proficient users of ICTs. Today's students are expected to achieve success in our global economy; therefore it is critical teachers reflect on how to teach and assess online comprehension (Coiro, 2005). The American population agrees that today's students need 21st century skills to prepare students for today's workforce. In a nation wide poll, 71% of voters feel that new technologies are critical for today's 21st century learner; however, only 25% of voters feel schools do an adequate job of preparing students for these demands (Partnership for 21st Century Skills, 2004). Reading on the Internet does require new strategies including how to search, locate, evaluate, and synthesize online text. By applying our knowledge of comprehension with printed text, teachers develop a digital framework for teaching new literacies skills in today's classrooms. Undoubtedly, new literacies skills must be included in present curriculum to allow today's students to become proficient readers with Internet texts. Knowing the necessary strategies to comprehend information on the Internet will be invaluable for 21st century students. This

study examines the impact on strategy instruction as well as the variables that best predict performance on a measure of online reading comprehension.

CHAPTER III

METHODOLOGY

Restatement of Purpose

The purpose of this study is to investigate the effects of online reading instruction on student performance of an online reading comprehension assessment. The following questions were addressed: 1) What is the relationship between demographic variables and self-reported Internet use and Internet skill?, 2) Which variables best predict performance on an online reading comprehension assessment?, and 3) How do lessons on online reading strategies affect student performance on an online reading comprehension assessment?

This study was conducted over a 12-week period in fifth grade Language Arts classrooms with eight consecutive weeks of intervention lessons in online reading comprehension. The repeated measures quasi-experimental research design allowed a quantitative investigation of online reading comprehension instruction to provide a reliable and valid assessment of the impact of online reading comprehension instruction on changes in student performance on an established measure of online reading comprehension. Additional attention to common variables known to influence outcomes in reading and technology performance (e.g., demographic variables, prior reading

achievement scores) strengthened the design by allowing a more refined analysis of the isolated impact from the instructional activities.

Setting

The study was conducted at an intermediate school comprised of 5th and 6th grade students. The school was located in a suburban location 25 miles north of a large Midwestern city. The school enrolls 1,015 students with an average class size of 27 students. During the 2010-2011 school year, 72% of the school's population was White, 11% Black, 7% Asian/Pacific, 7% Multiracial, 3% Hispanic, and less than 1% American Indian. Thirteen percent of students received free and reduced lunch. The school is a high performing school with 82% of all students passing the 2008-2009 Indiana Statewide Testing for Educational Progress-Plus (ISTEP+) assessment, which is approximately 17% higher than the state average.

Participating Teachers

Twelve teachers volunteered to participate in this study with an average of nine years teaching experience. Seven of the 12 participating teachers have received master's degrees in elementary education. There are six teams of teachers in this school with five of the six teams working as a three-member team and the remaining team having a total of four teachers. Seven of the 12 teachers teach two sections of Language Arts and five teachers teach only one section of Language Arts. Of the 19 participating classrooms, five Language Arts classes follow an advanced curriculum of one year above grade level.

Participating Students

To be eligible for this study, the student must have been between the ages of nine and twelve and participated as a 5th grade Language Arts student during the 2010-2011 school year. The number of subjects who agreed to participate in this study totaled 443 with 214 male students and 229 female students. Sixteen percent of students participating received free and reduced lunch. For ethnicity, 75% of students were White, 8% Black, 2.5% Hispanic, 7.4% Asian/Pacific, 7% Multiracial, and less than 1% American Indian.

Measures

Several measures were used to explore the research questions. The study first examined self-reported Internet use and Internet skill within an Internet Usage Questionnaire. Second, an analysis was run to investigate potential predictors of online reading performance, and third, performance on a measure of online reading comprehension was examined to determine the effect on online reading comprehension instruction.

Student Demographic Information

Upon receipt of signed parent permission forms, participating children's school records were accessed. As outlined in the parent permission form, the children's demographic information including gender, sex, ethnicity, free and reduced lunch, and special education were gathered to enable analyses examining relationships among student characteristics and online reading performance. To ensure confidentiality, all participating students were coded by their student identification number.

Traditional Reading Achievement

The ISTEP+ statewide assessment provides a measure of proficiency for the Indiana academic content standards. An indicator of scores on the English/Language Arts ISTEP+ (ELA ISTEP+) ranges from a low of 160 to a high of 820. The requirement for pass in English/Language Arts is 468. Students fall into the Pass+ category by scoring 548 and above. The ELA ISTEP+ measures a collection of literacy skills including vocabulary, reading comprehension, and writing applications for grades three through ten. Table 3.1 contains the achievement levels of the fifth grade students participating in the study on the English/Language Arts portion of the ISTEP+ assessment.

Table 3.1

Summary of Spring 2010 English/Language Arts Indiana Statewide Educational Testing Preparation Plus (ELA ISTEP+) for all Participants

ELA ISTEP+ (n=443)	Total #	Total %
Below (Did not Pass)	105	23.7%
Above (Pass)	258	58.2%
Pass Plus	70	15.8%
Undetermined	10	2.3%

The Scholastic Reading Inventory (SRI) reading assessment is a computer adaptive reading assessment program that measures reading comprehension using the Lexile Framework® for Reading. As students are presented with questions, the questions progressively increase or decrease in difficulty until the student's reading ability has been determined. According the Scholastic Reading Inventory, fifth grade reading levels fall

within a Lexile® range of 700-1000. Table 3.2 contains the achievement levels of the fifth grade students participating in this study on the SRI.

Table 3.2

Summary of Winter 2011 Scholastic Reading Inventory (SRI) for all Participants

SRI Performance (n=443)	Total #	Total %
Below Grade-level Lexile®	77	17.4%
One Grade-Level Lexile®	223	50.3%
Above Grade-Level Lexile®	140	31.6%
Undetermined	3	.7%

Internet-Usage Questionnaire

All fifth grade students in participating classes completed a modified computer administered Internet use survey created by Castek (2008). This 45-item questionnaire was updated and adjusted for this study with guidance provided by the author of the original version to address current Internet activities as well as update the content for this population of students. The survey assessed both self-reported Internet usage and Internet skill ability.

The first section of the questionnaire contained nine items. Two items asked students for basic demographic information (gender and age). The remaining four items asked students to rate their overall reading ability in both traditional and online environments as well as provide information regarding their access to computers. The second section of the questionnaire asked the following question: *How often do you do the following activities on the Internet outside of school?* Students were asked to list their time spent on the Internet outside of school for twenty activities (instant messaging,

games, school projects, etc.) using a 6-point response scale (never, less than once a week, once a week, a few times a week, once a day, several times a day). Two multiple choice questions asked students to rate themselves on their ability to summarize and synthesize on the Internet (i.e. *I summarize well, I'm an average summarizer, I don't summarize well*) followed by five short answer questions about their interests and motivations in online environments. The remaining ten questions also required students to rank their perceived ability using a seven point response-slide range (beginner to expert) on the new literacies skills of identifying questions, searching, evaluating, synthesizing, and communicating information. This 45-item questionnaire can be found in Appendix A.

Online Reading Comprehension Assessment Elementary-Revised

Online reading comprehension skills were estimated by performance on a modified version of the *Online Reading Comprehension Assessment Elementary* (ORCA-Elementary). The original ORCA-Elementary (Castek, 2008) contained a five-part assessment presenting fictitious informational tasks. The ORCA-Elementary was created from the new literacies perspective (Leu, et al., 2004) and simulated scoring procedures found in past online reading comprehension assessments with stable psychometric properties (Coiro, 2007; Leu, et al., 2005; Leu & Reinking, 2005).

These informational tasks on the ORCA-Elementary required students to demonstrate their understanding of the new literacies skills including 1) asking questions 2) locating information, 3) critically evaluating web information, 4) synthesis of information from multiple websites, and 5) effectively communicating information to others (Leu, et al., 2004). Each student was provided with up to thirty minutes to complete each of the five tasks. To establish reliability, Castek replicated a rubric design

from past ORCA measures shown to have sound psychometric properties (see Coiro, 2007; Coiro, Castek, Henry, & Malloy, 2007; Leu, et al., 2005; Leu & Reinking, 2005) to evaluate students' task responses and determine proficiencies. Cronbach's alpha revealed an inter-rater reliability coefficient of .790 suggesting a moderate level of internal consistency. Validity for this measure was established by first submitting the assessment to an expert panel for review. It was then piloted with two students representing each grade level participating in the study. An iterative revision process analyzing field notes, screen-capture data, and student responses occurred between the researcher, participating teacher, and expert panel. Through this revision process and rubric design, the ORCA-Elementary was shown as both a valid and reliable measure for the 4th and 5th grade students in Castek's study (2008).

Correspondence with Castek occurred during the development of the ORCA Elementary-Revised. Due to both time restraints and limited computer access, the researcher modified the ORCA-Elementary to four tasks within a 60-minute time frame. Each student was given up to 15 minutes to complete each of the four assigned tasks. Because the fifth task on the ORCA-Elementary required students to synthesize information across multiple websites, additional synthesis question of the same nature was added to the fourth task in the ORCA Elementary-Revised. Additionally, Castek's ORCA-Elementary rubric (2008) for task four was modified to assess this change. The protocol for administering the ORCA Elementary-Revised can be found in Appendix B; the task, and scoring rubrics for the ORCA Elementary-Revised can be found in Appendix C.

Task one was titled “Animal Endangerment. This task incorporated the skills of locating, searching, and synthesizing information. After reading an animated site, students were to respond by listing the primary reasons of animal endangerment, and ways kids can help protect endangered animals. To earn full credit on this task, students had to successfully locate the Web site, provide at least two reasons for animal endangerment, and two ways kids could help.

Task two titled, “How Many Otters are There?” asked students to locate, verify, and critically evaluate information. The question from task two asked students to explain whether the sites they found are reliable. To do this task accurately, students had to confirm results with more than one Web site and explore the author’s credentials and related experience with sea otters.

Task three was titled, “All About Sea Otters.” This task required students to locate a particular Web site and critically evaluate information within the Web site. Students were asked to explain how they knew the makers of the Web sites were experts. This task again involved evaluating the author’s credentials. To earn full credit, students had to correctly list the uniform resource locator (URL), explain who made the site, and provide a logical explanation of site reliability.

The final task titled, “Me and My Dog,” provided three links to similar sites on a related topic, dog friendly vacations. One of the three sites was a hoax site, and students had to evaluate each of the three sites to determine if any were deceptive or unreliable sources of information. Students were asked to list specifics from the Web site to justify their conclusions. After viewing all three sites, students were asked to synthesize across

the websites by providing specific examples as to how these locations would work to keep dogs safe.

Both the Internet questionnaire and the ORCA Elementary-Revised were collected through a secure web-based assessment environment data assessment system titled *InQsit* (Ball State University, 1997). Student responses were analyzed and scored by the researcher according to the ORCA Elementary-Revised rubrics to evaluate performance of new literacies skills.

Procedures

Recruitment

The researcher first met with the principal of the school to discuss the goals of the research study. Once the school principal submitted consent, the researcher then presented the study to the fifth grade teachers. The principal and participating teachers all agreed to then permit recruitment of students in all participating classrooms.

Recruitment of student subjects first occurred at the school's parent conference night where an outline of the study was provided for distribution to parents. Parents were encouraged to discuss the study with their child and contact the researcher with any questions regarding the study. Before the study began, a recruitment letter asking for parent permission was sent home with all fifth grade students. If consent was granted, both parties signed the attached permission form letter (see Appendix D).

Sampling

The researcher used a stratified random sampling technique (J. P. Gall, Gall, & Borg, 2005; M. Gall, Gall, & Borg, 2003) to ensure that there was not an overrepresentation of identified advanced Language Arts classes in either the control or experimental group (total of five advanced classes in the sample). Initially, two classes of advanced Language Arts classes were assigned to each condition, with the remaining advanced Language Arts class along with grade-level classes being randomly assigned to the control or experimental group. The end result was three teams of teachers in the experimental group (10 Language Arts classes), and three teams of teachers in the control group (9 Language Arts classes) with two out of the five advanced Language Arts classes participating in the experimental group. Table 3.2 and 3.3 shows the available English/Language Arts ISTEP+ and SRI scores for both the experimental and control group (n=433).

Table 3.3

Average Spring 2010 Indiana Statewide Testing for Educational Progress Plus in English/Language Arts (ELA ISTEP+) Scores

	# of Participating Students (n=433)	Average ELA ISTEP+ Performance Score
Experimental Group	228	491.85
Control Group	205	516.73

Table 3.4

Average Winter 2011 Scholastic Reading Inventory Scores (SRI) Scores

	# of Participating Students (n=440)	Average SRI Scores
Experimental Group	232	856.06
Control Group	208	934.52

Instructional Activities

Thirteen online reading comprehension sessions were assembled and designed by the researcher to teach the new literacies skills within the school's standard-based reading curriculum. The activities developed by the researcher drew on the researcher's experience as a 5th grade teacher as well as an extensive review of research literature. The content of the lessons followed the Indiana State Standards, National Education Technology Standards (NETS), National Council of Teachers of English (NCTE)/International Reading Association (IRA) National Standards for the English/Language Arts, as well as the school's curriculum map of English/Language Arts instruction. Teachers in the experimental group were provided with video tutorials, presentations, posters, and scripted lessons in an attempt to standardize each lesson. Lessons were organized by each of the five new literacies skills to a) question, b) locate, c) evaluate, d) synthesize, and e) communicate. An example of one online reading comprehension lesson can be seen in Appendix F.

Internet Reciprocal Teaching Model

The Internet Reciprocal Teaching Model (IRT; Leu, et al., 2008), based on the Reciprocal Teaching Model (Palincsar & Brown, 1984), was used to develop the 13 intervention lessons on online reading comprehension for students in the experimental group. Two patterns emerging from the Teaching Internet Comprehension to Adults (TICA) project (Leu & Reinking, 2005) were considered and included in the lesson development. The first pattern breaks down instruction into three phases of online reading. The five online reading skills to: a) question, b) search, c) evaluate, d) synthesize, and e) communicate were incorporated into a three-phase teaching model. During phase one, the teacher first modeled his or her thinking by demonstrating the select skill with online text. Phase two allowed the students to work collaboratively with their peers to practice the online reading skill. This phase involved guided practice as students collaboratively engaged in Internet tasks. Last, during phase three, students engaged in an independent Inquiry to apply knowledge of the online reading skill to authentic learning situations.

The second pattern followed is the progression from simple to more complex online reading tasks. Students first began learning basic Internet proficiencies prior to instruction on evaluation and synthesis. This allowed students to gain confidence and naturally progress through the five established skills of online reading. As learning progressed, students chose an inquiry topic based on personal interest to complete the research process. Within each online reading skill, tasks became increasingly difficult as students advanced through the three-phase model. Additionally, student discussion was

incorporated into each lesson to allow students to reflect on learned material and gain insights from their classmates.

Description of Instructional Sessions

Activities found within the 13 online reading sessions incorporated the lesson ideas, modules, and interactive challenges from the 21 Century Information Fluency Web site (<http://21cif.com/index.html>). This Web site, based on a Digital Information Fluency (DIF) model, provides resources to help students locate, evaluate, and utilize digital information. Permission was granted from the authors of the 21st Century Information Fluency Project to integrate these resources into the experimental group's online reading sessions.

The first set of lessons, titled "Nuts and Bolts," began by teaching students the basic skills needed to effectively utilize and understand the tools available to support reading in online environments. Students engaged in lessons on how to open and navigate within Web sties, discover shortcuts, utilize online tools such as edit-find, learn important vocabulary, troubleshoot problems, and understand the basic layout of a Web page.

To teach the questioning strategy, lessons followed the topic, theme, focus flow-chart developed by Eagleton and Dobler (2007). A copy of this flow-chart can be found in Appendix E. Permission was additionally granted from the authors to incorporate this flow chart, as well as handouts published in their text, *Reading the Web*, as part of the questioning session. Students were taught how to self-generate questions to form an Internet query and develop two researchable questions on a self-selected topic.

Sessions three and four were focused on query searching. The objective of these lessons was to teach students how to effectively find information in online environments. Students first learned how to generate effective key words followed by the implementation of the Search Box Strategy (see <http://21cif.com/tutorials/micro/mm/searchbox>) to revise keywords, check results, and revise the search until relevant information was located.

A great amount of attention was given to the need to develop critical web evaluation skills as past studies imply this is an area of substantial difficulty for students (Castek, 2008; Dwyer, 2010; Kuiper, et al., 2008). Students spent five of the 13 sessions working on critical evaluation through questioning the author, checking the accuracy of information, learning about copyright, and learning to detect bias within a Web site. Web evaluation concluded with an evaluation of a student selected Web site related to students' inquiry topics.

To synthesize information, students created an online concept map using bubbl.us (see <https://bubbl.us>) incorporating learned information from their inquiry research. Utilizing this concept map allowed students to categorize information from multiple Web sites, then synthesize information as a post on a class blog. The final new literacies skill of communication was incorporated into session five, six, and thirteen. A suggested timeline for the online reading sessions can be found in Table 3.3.

Table 3.5

Suggested Timeline for Online Reading Comprehension Sessions

Session(s)	Skill	IRT ^a Phase ^b	Lesson(s)	Estimated Time
1	Basic Skills	1-2	Nuts & Bolts	45-60 min
2	Questioning	1-3	What is Your Question?	45-50 min
3	Searching	1-2	Key It In	35-40 min
4	Searching	1-2	Search Box Strategy	45 min
5-6	Searching/ Communication	2-3	Inquiry Searching	60-90 min
7	Critical Evaluation	1-2	Who is the Author?	45 min
8	Critical Evaluation	1-2	Is it Accurate?	30-45 min
9	Critical Evaluation	1-2	Cite the Copyright!	20 min
10	Critical Evaluation	1-2	Bias, It's Everywhere	20 min
11	Critical Evaluation	3	Evaluation Wizard	30 min
12	Synthesis	1-3	Synthesizing Information	45 min
13	Synthesis/ Communication	2-3	Synthesis Response	45 min

^aInternet Reciprocal Teaching ^bPhase 1 - teacher modeling, Phase 2 - guided practice, Phase 3 - independent inquiry

One computer lab with 30 computers and 25 laptops with wireless connections were evenly shared throughout the study giving each participating student equal access to computers during the duration of this study. All participating teachers had a Liquid Crystal Display (LCD) projector where online information as well as presentation documents were projected onto a classroom screen for all students to view. Lessons for

participating teachers either took place in the classroom with laptops or in the school's computer lab due to the limited access of computers in the building. Students in the control group possibly utilized the lab or laptops during the duration of this study with one of their content area teachers; however, computer access with control group participants did not involve any intervention instruction on the online reading comprehension processes.

Data Collection Procedures

This study was conducted over a continuous 12-week period with eight of the 12 weeks incorporating online reading comprehension instruction leaving two weeks for administration of the ORCA Elementary-Revised pretest, and two weeks for administration of the ORCA Elementary-Revised posttest. All teams of students completed the Internet questionnaire, ORCA Elementary-Revised pretest, and ORCA Elementary-Revised posttest. The experimental groups participated in the online reading sessions during their Language Arts rotation, and the control group received regular classroom reading instruction during that time.

Students were first administered the Internet Usage Questionnaire prior to taking the ORCA Elementary-Revised pretest. All measures were administered in the school's computer lab by the participating students' Language Arts teacher. Teachers were provided with a copy of the directions and a protocol (see Appendix B) including how to ready computers, scripted task directions, as well as how to respond to student questions without influencing search behavior or revealing task answers. The protocol for administering these measures was given to all participating teachers prior to the

assessment dates. Completion of the Internet usage questionnaire lasted approximately 20 minutes, and the ORCA Elementary-Revised was a fixed 60-minute assessment with each of the four tasks being limited to 15 minutes. ORCA Elementary-Revised was again administered at the end of the study following the same protocol and serving as a posttest.

Analytical Design

To begin, a factor analysis was conducted to determine if the Internet Usage Questionnaire could be explained in terms of factors. Following this factor analysis, descriptive statistics were run to determine which categorical variables could describe characteristics on the Internet Usage Questionnaire. Descriptive analyses were then used to determine demographic variable differences between the experimental and control group on the Internet Usage Questionnaire.

In addition, a regression analysis (Tabachnick & Fidell, 2001) examined the most relevant variables predicting individual student differences on online reading comprehension skills at the outset of the study. In this regression analysis, performance on the ORCA Elementary-Revised pretest was the outcome variable with the following possible predictor variables: student demographic information (race, gender, socioeconomic status), self-reported Internet use, self-reported Internet skill, and traditional standardized reading achievement.

The primary analysis was a repeated measures analysis of covariance with the dependent variable being the performance change on the ORCA Elementary-Revised from pretest to posttest, adjusting for the students' performance levels on the traditional reading measures of the ISTEP+ and SRI. The independent variable for this primary

analysis was participation in the experimental group who received the series of online comprehension lessons during their Language Arts courses over an 8-week period.

To analyze all quantitative data, the researcher used the Statistical Package for Social Sciences (SPSS). Online comprehension instruction was examined by using repeated measures analysis to test differences between the pretest and posttest as well as the interaction effects with other potential group variables (e.g. high ability vs. low ability, gender, race, etc.). Responses from the Internet Questionnaire were examined for trends among the students chosen for each of the two groups.

CHAPTER IV

RESULTS

The current study was undertaken to examine the effects of online reading comprehension instruction. Preliminary analyses first generated descriptive statistics on demographic variables and experimental group status. A main analysis then examined the relationship between demographic variables and online reading performance. Findings from the Internet Usage Questionnaire provided demographic patterns of Internet use for this age group of participants. After determining this relationship, a regression analysis investigated which variables best predict performance on the Online Reading Comprehension Assessment Elementary-Revised (ORCA Elementary-Revised). Finally, repeated measures analyses determined if the intervention lessons had a significant effect on overall online reading performance. Overall performance as well as performance on specific subskills within the ORCA Elementary-Revised is last reported to determine the degree of student success on a measure of online reading.

Preliminary Analyses

Upon completion of data collection procedures, descriptive statistics were computed and initial statistical analyses were performed for all 443 participants in the study. The number of students in the control and experimental groups initially totaled

234 and 209 respectively. Prior to beginning the main analyses, an examination of special education status, gender, ethnicity, and socioeconomic status was deemed important to determine if group differences on these variables would significantly influence the results of the primary analyses. Missing data for these analyses was handled by listwise deletion.

Special Education Status

An analysis comparing students identified as qualifying for special education services to the remaining members of the study sample revealed a significant difference on the English/Language Arts Indiana Statewide Assessment Preparation Plus (ISTEP+), Scholastic Reading Inventory (SRI), as well as the pretest administration of the Online Reading Comprehension Assessment Elementary-Revised (ORCA Elementary-Revised, see Tables 4.1 and 4.2). Based on these differences at the outset of the study and the presence of varied intervention strategies for learners with identified education plans in the special education group, those students with a special education identification (n=25) were excluded from the data analyses for this study. After the special education students were removed, 200 participants in the control group and 218 participants in the experimental group remained in the study.

Table 4.1

Mean Scores of Identified Special Education Students and Non-identified Students in Total Sample

	Identified (n = 25)		Nonidentified (n=420)	
	Mean	SD	Mean	SD
ELA ISTEP+ ^a	443.25	41.35	507.17	55.30
SRI ^b	586.22	262.66	910.08	210.56
Pretest ORCA ^c Elementary Revised	9.29	4.19	13.67	5.08

^aEnglish/Language Arts Indiana Statewide Assessment Preparation Plus

^bScholastic Reading Inventory

^cOnline Reading Comprehension Assessment

Table 4.2

Comparison of Identified Special Education Students and Non-Identified Students in Total Sample on Tests of Academic Performance

		<i>df</i>	Mean square	<i>F</i>	<i>p</i>
ELA ISTEP+ ^a	Between	1	92619.53	31.020	.0001
	Within	431	2985.84		
SRI ^b	Between	1	2406355.96	57.852	.0001
	Within	404	41595.03		
Pretest ORCA ^c Elementary Revised	Between	1	471.07	18.612	.0001
	Within	440	25.32		

^aEnglish/Language Arts Indiana Statewide Assessment Preparation Plus

^bScholastic Reading Inventory

^cOnline Reading Comprehension Assessment

Gender

An analysis of gender was conducted to determine the overall performance pattern for the boys and girls in the study. Results show no significant gender performance difference on norm-referenced measures of English/Language Arts; however, female participants scored significantly higher than male participants on the Pretest ORCA Elementary-Revised (see Tables 4.3 and 4.4). These initial differences raised concern that gender would be a necessary additional independent variable in the primary analyses. However, examination of the impact of gender after controlling for the impact of prior academic achievement measures (ELA ISTEP+ and SRI) revealed that the gender differences did not provide significant unique impact explaining performance on the ORCA Elementary-Revised, and gender was removed from subsequent analyses to simplify the analytical design.

Table 4.3

Mean Scores for Gender in Total Sample

	Male		Female	
	N	Mean (SD)	N	Mean (SD)
ELA ISTEP+ ^a	194	503.73 (51.44)	215	510.27 (58.51)
SRI ^b	198	908.86 (225.03)	219	911.18 (197.08)
Pretest ORCA ^c Elementary Revised	198	13.04 (4.89)	219	14.24 (5.18)

Table 4.4

Comparison of Gender in Total Sample on Tests of Academic Performance

		<i>df</i>	Mean square	<i>F</i>	<i>p</i>
ELA ISTEP+ ^a	Between	1	4358.94	1.43	.233
	Within	407	3054.576		
SRI ^b	Between	1	561.65	.013	.911
	Within	415	44442.10		
Pretest ORCA ^c Elementary Revised	Between	1	149.00	5.85	.016
	Within	415	25.46		

^aEnglish/Language Arts Indiana Statewide Assessment Preparation Plus

^bScholastic Reading Inventory

^cOnline Reading Comprehension Assessment

Ethnicity

When examining ethnicity, a significant difference on the ELA ISTEP+, SRI, and the Pretest ORCA Elementary-Revised was noted at the outset of the study; however, due to the unbalanced ratio of minority students in the study, there were not enough participants per ethnicity to make a meaningful analysis (see Tables 4.5. and 4.6). To ensure that ethnicity did not affect the main analysis, which examines change in online reading comprehension over time, an investigatory repeated measures analysis of variance was conducted examining growth rates among the students from varied ethnic and racial backgrounds. The analysis confirmed there were no differences in rates of acquiring skills in this domain. This lack of effect on student change over the course of

the intervention combined with the disparate representation from different ethnic backgrounds precludes exploration of this variable meaningfully.

Table 4.5

Mean Scores for Ethnicity in Total Sample

	ELA ISTEP+ ^a		SRI ^b		Pretest ORCA ^c Elementary Revised	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
White/NonHispanic	304	509.06 (52.48)	310	924.39 (212.29)	309	13.36 (4.98)
Black/NonHispanic	32	472.66 (43.49)	33	780.88 (174.29)	34	11.53 (4.45)
Hispanic	10	497.70 (46.77)	10	807.90 (200.42)	10	13.30 (4.57)
Asian Pacific Islander	32	521.88 (63.21)	33	956.94 (198.14)	33	15.42 (5.65)
Multiracial	30	511.80 (74.98)	30	884.57 (195.93)	31	14.50 (5.66)
American Indian	1	523 (0)	1	979.00 (0_)	1	18 (0)

^aEnglish/Language Arts Indiana Statewide Assessment Preparation Plus

^bScholastic Reading Inventory

^cOnline Reading Comprehension Assessment

Table 4.6

Comparison of Ethnicity in Total Sample on Tests of Academic Performance

		<i>df</i>	Mean square	<i>F</i>	<i>p</i>
ELA ISTEP+ ^a	Between	5	9581.94	3.22	.007
	Within	403	2976.83		
SRI ^b	Between	5	163093.84	3.80	.002
	Within	411	42891.89		
Pretest ORCA ^c Elementary Revised	Between	5	59.71	2.34	.040
	Within	411	25.34		

^aEnglish/Language Arts Indiana Statewide Assessment Preparation Plus

^bScholastic Reading Inventory

^cOnline Reading Comprehension Assessment

Socioeconomic Status

To explore the impact of socioeconomic status (SES) on the achievement measures, student eligibility for free or reduced lunch status was employed. A one-way analysis of variance examining differences for free and reduced lunch status noted no significant difference on the Pretest ORCA Elementary-Revised or SRI (see Tables 4.7 and 4.8). Significant differences were noted on the ELA ISTEP+ measure, but once again it was confirmed that the SES status could be removed from the main analysis as an independent variable once the ELA ISTEP + covariate was included in the main ANCOVA.

Table 4.7

Mean Scores for Socioeconomic Status Indicator on the ORCA Elementary-Revised Pretest

	Free or reduced lunch status		Paid lunch status	
	N	Mean (SD)	N	Mean (SD)
ELA ISTEP ^a	65	486.94 (50.34)	344	510.99 (55.43)
SRI ^b	67	833.69 (211.73)	350	924.70 (207.45)
Pretest ORCA ^c Elementary Revised	67	12.73 (4.56)	350	13.85 (5.15)

^aEnglish/Language Arts Indiana Statewide Assessment Preparation Plus

^bScholastic Reading Inventory

^cOnline Reading Comprehension Assessment

Table 4.8

Comparison of Socioeconomic Status in Total Sample on Tests of Academic Performance

		<i>df</i>	Mean square	<i>F</i>	<i>p</i>
ELA ISTEP ^a	Between	1	31628.63	10.59	.001
	Within	398	2987.57		
SRI ^b	Between	1	465848.87	10.75	.001
	Within	404	43320.93		
Pretest ORCA ^c Elementary Revised	Between	1	70.19	2.74	.099
	Within	406	25.649		

^aEnglish/Language Arts Indiana Statewide Assessment Preparation Plus

^bScholastic Reading Inventory

^cOnline Reading Comprehension Assessment

Experimental Group Status

A series of one-way analyses of variances (ANOVAs) were run to determine potential differences between the experimental and control groups on the primary achievement measures and to ensure that the sampling process had not led to a pre-existing difference. This check was determined necessary because the groups established in this study were not assigned with a complete randomized design at the student level. A stratified random sampling technique was used to place teams of teachers in the two groups. This was employed to ensure that the two groups had similar representation for the high ability Language Arts classes. As with the other demographic indicators, a series of one-way ANOVAs were conducted exploring group differences on the SRI, ELA ISTEP+, and ORCA Elementary-Revised pretest. Missing data on these analyses was handled by listwise deletion.

Assumptions of independence and normal distribution were met in this data set. Box's Test of Equality of Covariances Matrices revealed a violation of homogeneity of variance ($p=.001$); however, Tabachnick and Fidell (2001) warn this test is too sensitive with large sample sizes and can be disregarded if the samples sizes are sufficiently equivalent. The data indicated there were significant differences among the experimental and control groups on the ELA ISTEP+, SRI, and Pretest ORCA Elementary-Revised (see Tables 4.9 and 4.10). Participants in the control group achieved greater means on all three comparisons between the two groups. Because there were differences between the experimental and control groups at the outset of the study, the remaining analyses in the primary examination of impact of the intervention were conducted using achievement on

the norm-referenced measures of English Language Art including both the ELA ISTEP+ and SRI as covariates. A Pearson product-moment correlation coefficient was computed to assess the relationship between the ELA ISTEP+ and SRI as norm-referenced measures of English/Language Arts. To determine the strength of the relationship, Cohen's (1988) range of (+/-).5 to (+/-)1.0 was used to indicate a strong relationship between variables., (+/-).30 to (+/-).49 for a medium relationship, and (+/-).10 to (+/-).29 for a small relationship. There was a strong correlation between the ELA ISTEP+ and SRI variables used as covariates in this study ($r=.656, p=.001$).

Table 4.9

Group Means on Standardized Achievement and Online Reading Comprehension

	Experimental		Control	
	N	Mean (SD)	N	Mean (SD)
ELA ISTEP+ ^a	212	496.12 (43.659)	197	519.06 (63.552)
SRI ^b	217	875.91 (191.916)	200	947.15 (223.721)
Pretest ORCA ^c Elementary Revised	218	13.11 (4.452)	199	14.29 (5.627)

^aEnglish/Language Arts Indiana Statewide Assessment Preparation Plus

^bScholastic Reading Inventory

^cOnline Reading Comprehension Assessment

Table 4.10

Analysis of Variance on Standardized Achievement and Online Reading Comprehension

		<i>df</i>	Mean square	<i>F</i>	<i>p</i>
ELA ISTEP+ ^a	Between	1	53750.04	18.33	.000
	Within	407	2933.22		
SRI ^b	Between	1	528167.55	12.23	.001
	Within	415	43170.76		
Pretest ORCA ^c Elementary Revised	Between	1	145.08	5.68	.017
	Within	415	25.47		

^aEnglish/Language Arts Indiana Statewide Assessment Preparation Plus^bScholastic Reading Inventory^cOnline Reading Comprehension Assessment

Primary Analyses

The primary analyses for the study were driven by the three research questions:

- RQ1: What are the relationships among student demographic variables and self-reported Internet use and Internet skills?
- RQ2: Which variables best predict performance on an online reading comprehension assessment prior to program instruction?
- RQ3: How do lessons on online reading strategies affect student performance on an online reading comprehension assessment?

RQ1) Relationship between Demographic Variables and Online Reading Performance

Of the 420 participants in this study, data on the Internet Usage Questionnaire was available for 409 students. Missing data on the Internet questionnaire was handled by list wise deletion. Three types of statistical analysis were used on the questionnaire data set. First, a factor analysis was used as a data reduction technique to determine if the variables found within the Internet questionnaire could be explained in terms of factors, and second, descriptive statistics were run to determine and compare categorical variables on the Internet Usage Questionnaire.

Contributing Factorial Solution for the Internet Questionnaire

Prior to conducting a factor analysis on the variables found within the questionnaire, the data set was assessed for suitability. Tabachnick and Fidell (2001) suggest a minimum of 300 cases for factor analysis. The large sample size found within this questionnaire (n=409) is ideal to determine which variables can be grouped together to represent a single factor. Questions and sub questions found on the Internet questionnaire for numbers eight through ten were listed as a response scale asking participants the following question: “How often do you do the following activities on the Internet outside of school?” These questions can be grouped together to create one durable measure for *Internet use*. Questions 18 through 26 asked students to rate their skill level for a variety of online reading skills ranging from beginner to expert. These questions can be grouped together to create one measure for *Internet skill*. Factor analysis results for Internet use and Internet skill scale are presented (see 4.11). Developing these two scale scores rather than looking at all the items combined

established two factors to explain the bulk of the questionnaire data set and establishes a more durable measure of Internet use and skill than and single item exploration.

Table 4.11

Factor Loadings Internet Usage Questionnaire

	Factor	
	“Internet Use”	“Internet Skill”
I use the Internet to find things on search engines	.388	
I use the Internet to read or write e-mail	.627	.373
I use the Internet to use Instant Messenger	.597	
I use the Internet to read or post to blogs	.540	
I use the Internet to use chat rooms	.542	
I use the Internet to access a social network (i.e. Facebook, My Space)	.518	
I use the Internet to download music	.496	
I use the Internet to view videos	.571	
I use the Internet to read about sports	.430	
I use the Internet to read about movies, music, or pop culture	.620	
I use the Internet to find clip art and pictures	.528	
I use the Internet to view clip art and pictures	.614	.358
I use the Internet to learn about things that interest me	.557	
I use the Internet to read about current events	.609	

(continued)

Factor Loadings Internet Usage Questionnaire (continued)

	Factor	
	“Internet Use”	“Internet Skill”
I use the Internet to read about school related assignments	.362	
I use the Internet to buy things	.423	
I use the Internet to play games	.503	
I use the Internet to create websites	.413	
I use the Internet to check the accuracy of information on websites	.563	
I use the Internet to see who created information on websites	.457	
Search for general information on the Internet (ex: dogs)		.621
Searching for specific information on the Internet (ex: how large pug dogs grow to be)		.679
Picking the best site when given a list of search engine results		.452
Reading information on the Internet		.557
Writing and sending e-mail messages	.403	.522
Typing homework assignments or other documents		.607
Using the Internet to answer a question		.667
Explaining to classmates ways to get around the Internet		.608
Explaining to classmates ways to read, write, and share ideas on the Internet		.580

Results from the factor analysis indicate the targeted Internet Usage Questionnaire items measured two broad factors related to Internet usage: 1) Internet use, and 2) Internet skill. The Kaiser-Meyer-Olkin value was .50 not reaching the recommended value of .6 (Kaiser 1970, 1974) for sampling adequacy, and Bartlett's Test of Sphericity (Bartlett, 1954) was .0001 reaching statistical significance for factorability of this correlation matrix. In addition, Cronbach's Alpha for both subscales showed a relatively high internal consistency with a .885 coefficient for Internet use and a .816 coefficient for Internet skill.

Categorical Variables on the Internet Usage Questionnaire

Descriptive statistics for categorical variables was used to describe and compare characteristics found on the Internet Usage Questionnaire for both the experimental and control groups. A frequency analysis determined total percentages on questions and sub questions found on the questionnaire. Participants completed multiple questions asking basic demographic information, perceived reading ability with traditional and online text, and access to computers. Students completed a response scale indicating the activities they participate in outside of the school day as well as the how frequently each activity occurred. To examine Internet skills, students ranked themselves on a scale ranging from beginner to expert. Participant responses for select items are presented in Tables 4.12 and 4.13. A complete table of the Internet Questionnaire results for Internet use and Internet skill can be found in Appendix G and Appendix H respectively.

Results from the Internet Usage Questionnaire showed 90% of total participants use the Internet most often at home. When examining perceived reading ability, the control group expressed a greater confidence with 53% of participants stating they are

very good traditional readers compared to 45% in the experimental group. Similarly, 40% of the control group stated they were very good readers on the Internet compared to 38% of participants in the experimental group. In total, 48% of students perceived themselves as good readers of traditional text compared to 39% of students stating they were good readers of Internet text. Students in the control group additionally reported more access to computers at home. Forty-four percent of students in the control group compared to 38% of participants in the experimental group have three or more computers connected to the Internet in their home environment.

When considering the skills of summary and synthesis with online text, 26% of the experimental group reported they summarize very well, and 64% feel they are an average summarizer compared to 29% and 57% of the control group respectively. With synthesis, 24% of the experimental group stated they synthesize well and 60% labeled themselves as an average synthesizer. Twenty-nine percent of the control group marked themselves as proficient in synthesizing and 57% stated they were average synthesizers.

As a whole, participants rarely evaluate information on websites as 70% of all participants stated they never check the accuracy of information on Web site and 83% never investigate who authored the Web site's information. For Internet use, participants in total most frequently used the Internet to play games (Mean=4.16) and spent the least amount of time creating Web sites (Mean=1.26) and purchasing items on the Internet (Mean=1.55). When examining perceived ability with Internet skills, participants combined felt most confident with typing basic documents (Mean=5.3) and doubted themselves most with explaining to classmates how to read, write, and share ideas on the Internet (Mean=3.7).

Table 4.12

Sample of Descriptive Statistics of Internet Use

		Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
<i>I use the Internet to. . .</i>							
find things on search engines	E ^a	37%	19%	12%	19%	4%	5%
	C ^b	50%	45%	23%	57%	7%	14%
read or write e-mail	E	33%	20%	16%	14%	5%	10%
	C	32%	21%	13%	18%	8%	6%
access a social network	E	53%	6%	6%	13%	8%	14%
	C	59%	9%	4%	11%	6%	10%
download music	E	30%	30%	13%	15%	4%	6%
	C	28%	39%	9%	13%	3%	7%
view videos	E	12.3%	22%	10%	32%	5%	17%
	C	11%	27%	10%	21%	10%	21%
learn about things that interest me	E	21.3%	25%	24%	14%	7%	7%
	C	17%	34%	18%	14%	9%	6%
read about current events	E	36%	28%	17%	8%	5%	1%
	C	34%	37%	13%	8%	4%	2%
read about school related assignments	E	26%	28%	19%	13%	8%	4%
	C	18%	42%	20%	12%	6%	2%

^aExperimental group^bControl Group

Table 4.13

Sample of Descriptive Statistics of Internet Skills

	Experimental (n=195)	Control (n=189)
	Mean (SD)	Mean (SD)
Searching for general information on the Internet (ex: dogs)	4.98 (2.02)	5.73 (2.46)
Searching for specific information on the Internet (ex: how large pug dogs grow to be)	4.72 (2.09)	5.07 (2.13)
Picking the best sites when given a list of search engine results	4.27 (2.53)	4.94 (2.40)
Reading information on the Internet	5.19 (2.60)	5.50 (2.35)
Writing and sending e-mail messages	5.12 (2.91)	5.15 (3.08)
Using the Internet to answer a question	5.23 (2.52)	5.27 (2.46)

Demographic Variables on Internet Usage Questionnaire

Descriptive analyses on demographic variables were run to determine if differences exist for Internet use and Internet skill between gender, ethnicity, and socioeconomic status. Results show no significant differences for gender on Internet use [$F(1, .36.48=.155, p=.694)$], or Internet Skill [$F(1, 67.65=.333, p=.564)$]. There was no

difference noted based on ethnic groups for Internet use [$F(5, 321.92=1.38, p=.232]$, or Internet Skill [$F(5, 214.88=1.06, p=.381]$. Socioeconomic status revealed no significant difference for Internet skill [$F(1, 283.33=1.40, p=.237]$. However, students who receive free or reduced lunch perceive themselves spending a significantly greater amount of time using the Internet outside of the school day than students who do not receive free or reduced lunch [$F(1, 1772.43=7.68, p=.006]$.

An examination of group means by gender (see Table 4.14), ethnicity (see Table 4.15), and socioeconomic status (see Table 4.16) is presented. As shown in Table 4.15, Hispanic participants' mean score for both Internet use and Internet skill is considerably lower than the remaining ethnicity groups. However, caution should be warranted in this interpretation due to the small sample size for this group ($n=10$), and lack of attaining significance on the ANOVA.

Table 4.14

Group Means on Internet Questionnaire by Gender

	Male (n = 194)		Female (n=215)	
	Mean	SD	Mean	SD
Internet use	45.12	14.99	44.53	15.64
Internet skill	43.07	13.99	43.88	14.47

Table 4.15

Group Means on Internet Questionnaire by Ethnicity

Group		Mean	SD
White/Non-Hispanic (n=303)	Internet use	44.18	14.63
	Internet skill	43.31	14.20
Black/Non-Hispanic (n=33)	Internet use	46.75	18.89
	Internet skill	43.92	15.02
Hispanic (n=10)	Internet use	38.20	14.76
	Internet skill	35.75	17.74
Asian/Pacific Islander (n=33)	Internet use	47.91	14.91
	Internet skill	43.93	15.02
Multiracial (n=29)	Internet use	47.17	14.91
	Internet skill	44.67	14.47
American Indian (n=1)	Internet use	66.00	0
	Internet skill	59.79	0

Table 4.16

Group Means on Internet Questionnaire by Socioeconomic Status Indicator

	Free or reduced lunch status (n = 57)		Paid lunch status (n=352)	
	Mean	SD	Mean	SD
Internet use	49.98	18.72	43.97	14.55
Internet skill	45.57	13.87	43.16	14.28

Summary: RQ1

The data analysis conducted to represent RQ1 examined relationship among student variables and self-reported Internet use and skill as measured by the Internet Usage Questionnaire. A factor analysis first confirmed a large subset of the Internet Usage Questionnaire could be grouped into two scale factors of Internet use and Internet skill. These two factors can be used to represent prior Internet experiences for participants in this study.

The experimental and control groups' descriptive information was then analyzed to compare perceived abilities on both traditional and online reading skills as well as the frequency of time spent engaging in Internet activities outside of the school day. At the outset of this study, descriptive results indicate the control group felt slightly more confident reading traditional and online text when compared to the experimental group as well as reported more access to computers connected to the Internet in the home environment. The majority of students in both groups indicated they never evaluate Web site and author information. Additionally, participants as a whole experience the greatest confidence with typing documents and struggle most with explaining how to read, write,

and share ideas on the Internet to others. An examination of demographic variables related to perceived Internet skill show no significant difference between gender, ethnicity, and socioeconomic status. Additionally, Internet use was insignificant between gender and ethnicity; however, students who receive free and reduced lunch scored significantly higher on perceived Internet use than students who do not receive this socioeconomic status indicator.

RQ2) Predictors of Online Reading Performance

Before investigating the impact of online reading comprehension skill lessons, it was first critical to recognize contributing factors to performance on the ORCA Elementary-Revised pretest scores. Essentially, a specific examination of demographic information that contributes to online reading performance was deemed important. In order to examine the factors that impact student performance on a measure of online reading, a regression analysis was employed entering demographic variables, prior reading performance, prior Internet use, and prior Internet skill as equal potential factors of initial performance on the ORCA Elementary-Revised pretest. From the descriptive analysis previously discussed, special education was removed from the data set due to the significant differences at the outset of this study (see Table 4.2).

The large sample size found in this study allows generalizable results. Tabachnick and Fidell (2001, p. 117) recommend using the following formula for calculating sample size requirements $N > 50 + 8m$ (m = number of independent variables). For this regression analysis, 397 cases were used, which is well above this ratio recommendation. An inspection of the Normal Probability Plot showed no major

deviations from normality. In addition, the data set was examined for the presence of outliers. Only a select few outlying residuals were noted on the scatterplot; however it is not uncommon to note a few outliers with a large sample size (Tabachnick and Fidell, 2001). Findings are presented from the standard multiple regression analysis (see Table 4.17).

Table 4.17

Regression Table Examining Potential Contributing Factors to Performance on the ORCA Elementary-Revised

	B	SE B	β	t	p
ELA ISTEP+ ^a	.028	.005	.307	5.29	.000
SRI ^b	.006	.001	.248	4.50	.000
Gender	.691	.454	.067	1.52	.129
Free and reduced lunch status	-.210	.624	-.015	-.337	.737
Internet use	.032	.016	.095	1.98	.049
Internet skill	.032	.018	.088	1.84	.067

Summary: RQ2

The regression analysis revealed that three significant predictors accounted for 28% of the variance in student performance on the ORCA Elementary-Revised pretest. A regression analysis confirmed that prior reading achievement on norm-referenced English/Language Arts tests (ELA ISTEP+ and SRI) as well as Internet use are the greatest predictors of online reading achievement for this sample of participants. Gender,

Internet skill, and socioeconomic status are insignificant contributing factors on the pretest ORCA Elementary-Revised.

RQ3: Effect of Online Reading Comprehension Intervention on Student Performance

Two separate analyses were run to determine the effects of the intervention lessons on online reading comprehension skills. First, a repeated measures analysis of covariance (ANCOVA) was used to examine the overall performance between groups, and second, a repeated measures multivariate analysis of covariance (MANCOVA) examined differences between groups over the duration of the study on three online reading subskills including locating, evaluating, and synthesizing information. Results from these analyses will determine if the intervention lessons significantly impacted online reading performance.

Overall ORCA-Elementary-Revised Performance Assessment

Due to the demonstrated differences between the groups at the outset of the study, the effects of prio academic achievement was controlled for in all primary analyses using analysis of covariance (ANCOVA). To test the first research question, examining the impact of the intervention on growth in online reading comprehension while controlling for initial differences in achievement, a repeated measures ANCOVA was employed examining the main effect of the independent variable (the intervention lessons), the main effect of time (the repeated factor as measured by the pretest and posttest), and the interaction of intervention and time, while controlling for the effect of the covariate variables interacting with these effects (SRI and ELA ISTEP+). Preliminary checks were conducted to ensure there were no violations of assumptions of normality and linearity,

homogeneity of regression slopes, and reliable measurement of the covariates. Levene's Test of Equality of Error Variances indicated equal variances for the ORCA Elementary-Revised Pretest ($F=3.38, p=.071$), and unequal variances on the ORCA Elementary-Revised Posttest ($F=5.50, p=.019$). The large sample size found within this data set increases the power of this study and accounts for the detection of unequal variances.

After adjusting for the influence of performance abilities as measured by the ELA ISTEP+ and SRI scores, the ANCOVA results show a significant difference between groups (see Table 4.19). First, there is a significant main effect for the repeated measure (time), as well as significant effects when the ELA ISTEP+ and SRI covariates are included in the design (time x ELA ISTEP+, time x SRI). The main analysis shown in Table 4.19 (time x group) illustrates the findings for this research question. Specifically, after accounting for the covariate measure of academic performance, the experimental group demonstrated significantly greater growth from pretest to posttest than the control group on the ORCA Elementary-Revised (see Figure 4.1). Interpretation of the effect of intervention lesson on online reading performance is enabled by viewing the estimated marginal means in Table 4.19.

Table 4.18

Group Differences in ORCA-ER Gains Over Time Controlling for Prior Achievement Variables: Repeated Measures ANCOVA

Source	Type III SS	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>
Time	93.047	1	93.047	8.346	.004
Time * ISTEP	51.871	1	51.871	4.653	.032
Time * SRI	103.754	1	103.754	9.307	.002
Time * Group	107.748	1	107.748	9.665	.002

Table 4.19

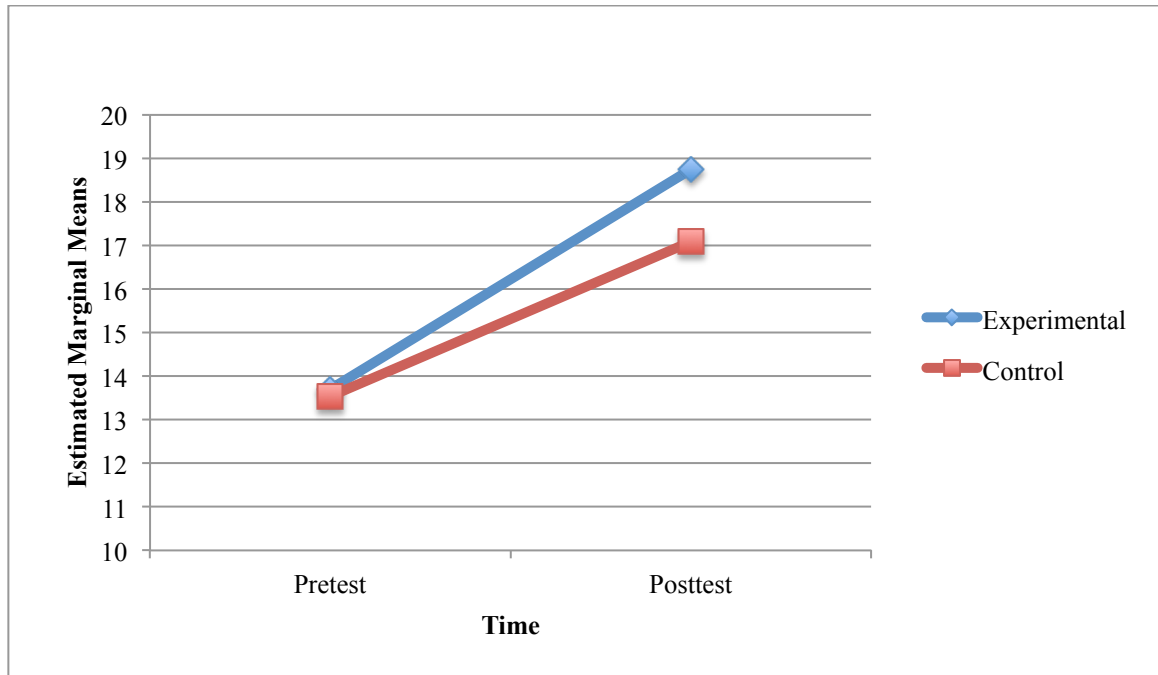
Unadjusted and Estimated Marginal Means on the ORCA Elementary-Revised Pretest and Posttest

	Experimental (N=212)		Control (N=196)	
	Pretest	Posttest	Pretest	Posttest
Unadjusted means	13.13	18.17	14.33	17.81
Estimated marginal means	13.703 ^a	18.751 ^a	13.536 ^a	17.082 ^a

^aCovariates appearing in the model are evaluated at the following values: ISTEP = 505.36, SRI = 903.67.

Figure 4.1

Experimental and Control Group Performance Trends on the ORCA Elementary-Revised



Individual ORCA-Elementary Revised Skill Analyses

To further explore the individual performance patterns on the three component parts of the ORCA Elementary-Revised, a repeated measures multivariate analysis of covariance (MANCOVA) was conducted. Following Castek's description (2008) of tasks embedded within the ORCA-Elementary, three subscales for the ORCA Elementary-Revised were explored (locating, synthesizing, evaluating). Prior to the repeated measures MANCOVA analysis, all 33 questions found within the four tasks of the ORCA Elementary-Revised were examined for missing values, data accuracy, and correspondence within the assumptions of the this analysis. Participants with missing data on either the pretest or posttest were removed from the study. The resulting data on

the pretest and posttest was available for all 410 participants. Preliminary assumption testing revealed no violations for linearity, univariate and multivariate outliers, and multicollinearity; however, due to the large sample size, Levene's Test of Equality of Error Variances revealed a violation on one of the six subscales, pretest locating ($F=7.94$, $p=.005$). Despite this violation, the unequal variance for this subscale was examined, interpreted, and reported.

As shown in Table 4.20, after controlling for standardized achievement measures, participants in the experimental group demonstrated significantly greater gains than their control group counterparts from pretest to posttest on the online skills of locating and synthesizing (see Figures 4.2 to 4.4). The statistical results by Internet skill (Table 4.21) and the means analysis (Table 4.21) show the outcome and interpretation of the repeated measures MANCOVA.

Table 4.20

Unadjusted and Estimated Marginal Means by Internet Skill: Repeated Measures MANCOVA

		Experimental (n=210)		Control (n=200)	
		Pretest	Posttest	Pretest	Posttest
Locate	Unadjusted means	4.81	6.56	5.55	6.45
	Estimated marginal means	5.051 ^a	6.830 ^a	5.296 ^a	6.157 ^a
Evaluate	Unadjusted means	4.59	5.95	4.49	5.67
	Estimated marginal means	4.738 ^a	6.100 ^a	4.327 ^a	5.511 ^a
Synthesize	Unadjusted means	3.81	5.75	4.29	5.67
	Estimated marginal means	3.950 ^a	5.898 ^a	4.140 ^a	5.506 ^a

^aCovariates appearing in the model are evaluated at the following values: ISTEP = 507.17, SRI = 911.98.

Table 4.21

Internet Skill Differences in ORCA Elementary-Revised Gains Over Time Controlling for Prior Achievement Variables: Repeated Measures MANCOVA

Source		Type III SS	df	Mean Square	F	p
Time * Experimental/Control Groups	Locate	41.070	1	41.070	16.499	.000
	Evaluate	1.555	1	1.555	.597	.440
	Synthesize	16.504	1	16.504	5.478	.020

Figure 4.2

Experimental and Control Group Performance Trends for the Online Reading Skill of Locating

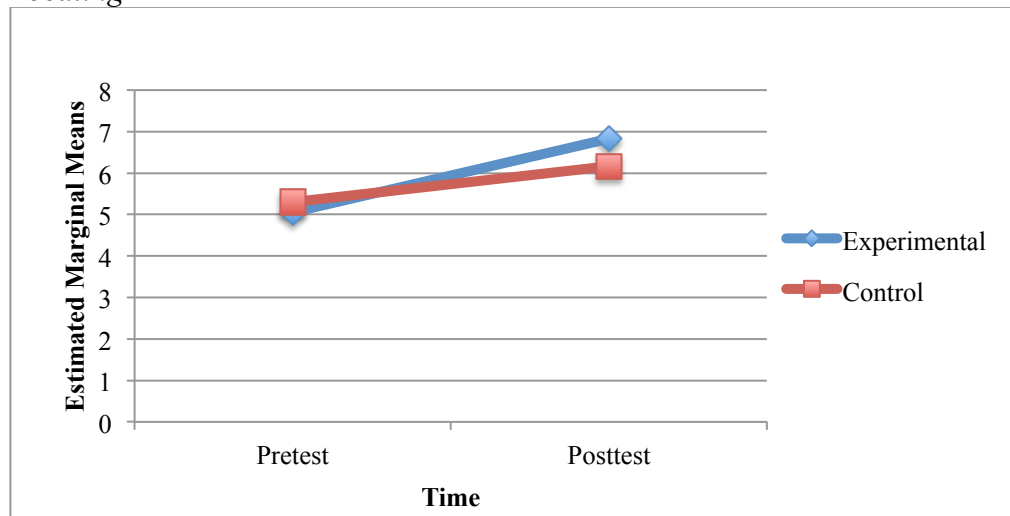


Figure 4.3

Experimental and Control Group Performance Trends for the Online Reading Skill of Evaluating

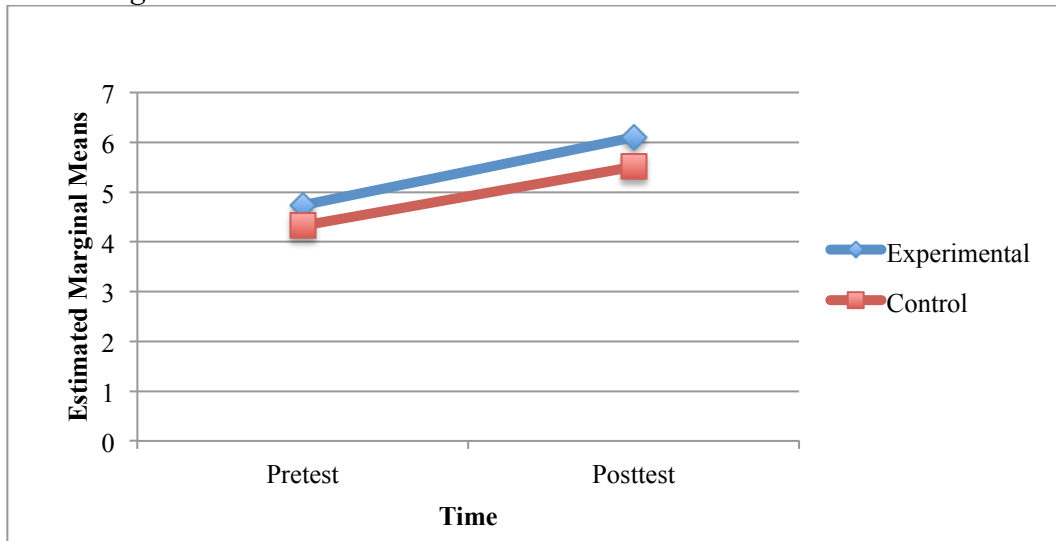
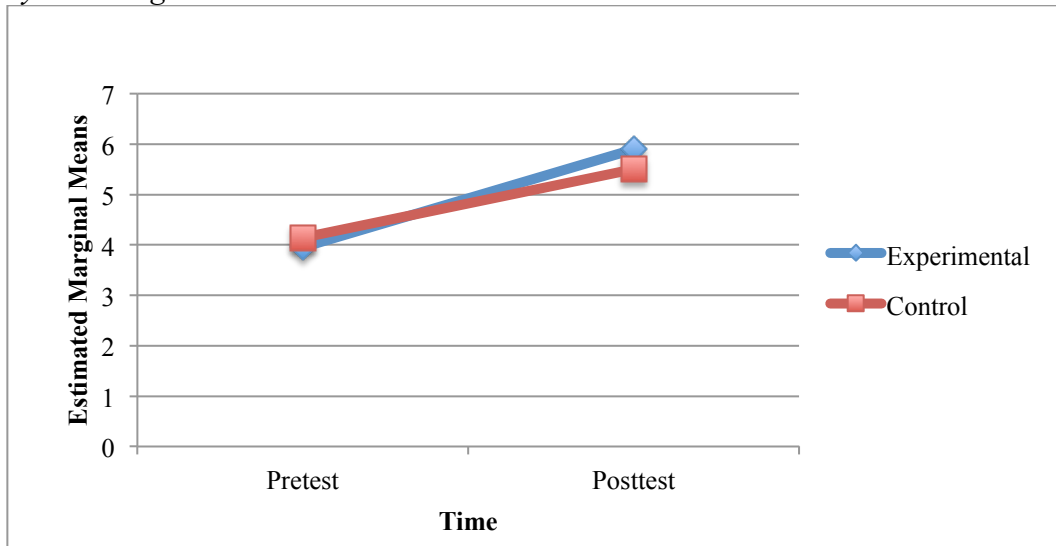


Figure 4.4

Experimental and Control Group Performance Trends for the Online Reading Skill of Synthesizing



Summary: RQ3

The data analyses conducted to examine RQ3 examined participant performance on an online reading comprehension assessment (ORCA Elementary-Revised). A comparison between the experimental and control groups was made by running a repeated measures ANCOVA to determine the difference between pretest and posttest total scores. The results show the experimental group demonstrated significantly greater gains than the control group on the overall online reading measure from pretest to posttest after controlling for the influence of prior academic achievement. In addition, each question found within the four subtasks was labeled by one of the following online reading skills: 1) locate, 2) evaluate, or 3) synthesize. The repeated measures MANCOVA shows experimental group students improved significantly on the skills of locating and synthesizing, at a rate greater than the control group. Although a means analysis shows the experimental group had greater performance levels on the evaluation subtest; the data set did not show a significant difference on the interaction term in this ANCOVA analysis.

Chapter Summary

The preliminary analyses of this data set indicated a significant difference with special education students on norm-referenced measures of English/Language Arts. As a result, students with a special education label were removed from this data set. Additionally, demographic differences among groups including gender, ethnicity, and socioeconomic status were not statistically significant at the outset of this study. Further descriptive examination showed the mean performance of the control group on the

ORCA Elementary-Revised was significantly higher than the experimental group at the outset of this study. Due to this difference in prior achievement, covariates were put into place to equalize the two groups on the primary analyses.

The main analyses began with a factor analysis on the Internet Questionnaire, creating an Internet use and Internet skill subscale within the Internet Use Questionnaire, to determine how Internet use and Internet skill is perceived by this population of fifth grade students. Findings revealed fifth grade students use the Internet most often for entertainment purposes (playing games, viewing videos, downloading music, etc) and seldom evaluate a Web site's information. Fifth graders as a whole are most confident typing documents and were most uncertain with explaining fundamental online reading skills to classmates.

Next, a regression analysis was conducted to explain potential predictors of ORCA Elementary-Revised performance at the pretest. Gender, socioeconomic status, prior achievement, self-reported Internet use, and self-reported Internet skill were entered as equal potential factors. Results from the analysis revealed three potential predictors of online reading achievement: 1) prior achievement on English/Language Arts ISTEP+, 2) prior achievement on the SRI, and 3) Internet use.

Last, findings from this quantitative analysis revealed a strong interaction effect ($p=.002$) when examining the interaction of the intervention lesson from pretest to posttest while controlling for prior achievement on norm-referenced measures of English/Language Arts suggesting students in the experimental group showed greater gains in online reading skills than students in the control group from pretest to posttest. Further analyses of the sub skills showed students in the experimental group performed

significantly higher than students in the control group on two out of the three online reading skills. These tasks required students to search and locate information as well as synthesize information within and across multiple Web sites. One subskill, evaluating information, did not show a significant increase in achievement despite the experimental group having a higher mean performance over students in the control group.

CHAPTER V

DISCUSSION

This study explored the effect of intervention lessons on online reading skills with fifth grade students. First, it sought to examine the relationships among demographic variables including gender, ethnicity, and socioeconomic status and self-reported Internet use and Internet ability. Second, this study was designed to investigate which variables best predict performance on a measure of online reading for a population of fifth grade students. Third, the effect of lessons designed to improve online reading comprehension was explored using a repeated measures analysis of covariance to determine the efficacy of targeted classroom-based instruction on learned skills. For each research question, this chapter presents a summary of findings along with implications of the findings for both instructional practice and the field of research in online reading comprehension. Finally, limitations imposed on the current study and conclusions are presented.

Research Questions Underpinning the Study

- RQ1: What are the relationships among student demographic variables and self-reported Internet use and Internet skills?
- RQ2: Which variables best predict performance on an online reading comprehension assessment prior to program instruction?

- RQ3: How do lessons on online reading strategies affect student performance on an online reading comprehension assessment?

Self-Reported Internet Use and Internet Skill

The first research question addressed the relationships among student demographic variables and their self-reported Internet use and Internet skill. To assess these relationships, the study first used factor analysis and scale reliability analyses to identify a composite measure of learners' reported use of Internet materials and their skills with online content. Next, the analyses turned to examining these variables in relation to student demographic variables to identify any group trends.

A factor analysis confirmed the Internet Usage Questionnaire was reliably measuring two primary dimensions of student response regarding using Internet materials. This generated two subscales within the assessment tool, identified as Internet use and Internet skill. Using these subscales from the Internet Usage Questionnaire (see Appendix A), analyses comparing students based on the demographic variables revealed no differences based on gender, ethnicity, or socioeconomic status on the Internet Use subscale. Internet skill additionally showed no difference for both gender and ethnicity; however, students who receive free and reduced lunch reported higher levels of using the Internet than students who did not receive free lunch (a common indicator for socioeconomic status).

Surprisingly, this contradicts previous demographic and socioeconomic research recognizing a “digital divide” as Black and Hispanic students, as well as students living with lower family incomes are less likely to use computers and the Internet compared to

White students living with higher family incomes (National Center for Education Statistics, 2006). This research additionally shows disadvantaged students use the Internet more often at school (2006). The findings from this analysis should be viewed as tentative, however, since the Internet Questionnaire measured only perceived Internet ability, not an actual measure of ability with online skills that could reliably measure differences among students on an objective task. Caution interpreting ethnicity results is also warranted, as there were not enough participants per minority group to make a meaningful analysis. Nevertheless, results from this study show minimal differences between individuals' demographic status and self-reported Internet ability.

Findings from this analysis may indicate high performing schools, such as the school in this study, can challenge previous demographic and socioeconomic research for Internet use and Internet skill. Similarly, Henry (2007) found students from privileged school districts performed higher on a measure of online reading comprehension when compared to students from disadvantaged districts. Furthermore, Zhi-Jin (2011) found the availability of ICT's at the school level positively impacts self-reported digital skills. Schools with high levels of parent involvement and high expectations for all students may serve as an exception to the Internet limitations disadvantaged students typically face.

Moreover, for this population females are just as likely as males to use the Internet and have similar perceptions of Internet skill. This supports research by the National Center for Education Statistics (NCES) stating that males and females reported similar percentages for Internet use both in and outside of school (2006).

When examining the students' reported patterns of Internet use outside of the

school day, the highest reported activity for both groups was playing games. Specifically, 75% of the experimental group and 82% of the control group reported playing games on the Internet at least once a week. These percentages are higher than the reported average of 56% from the National Center for Education Statistics (2006). The analysis of Internet skill revealed students felt the least comfortable explaining ways to read, write, and share ideas on the Internet to classmates. Students in this study rarely, if ever, critically evaluate the information they read online and reported paying little to no attention as to who authored the information.

Implications for Pedagogy and Future Research

Despite today's students being perceived as "digital natives" (Prensky, 2001), results indicate fifth grade students as a whole primarily use the Internet to play games, feel most comfortable typing basic word documents, and struggle most with explaining online reading comprehension proficiencies. In this study, students did not rate themselves as proficient with summarizing and synthesizing on the Internet. In fact, students' perception of themselves as "good readers" dropped nine percent when considering Internet text compared to traditional text. Students may possibly hold the belief that online texts are more challenging and written above the student's reading level. Past research confirms these results as students often lack the online reading knowledge necessary to read on the Internet after locating information in the search process (Wallace, et al., 2000). Students are often passive and haphazard users who spend the majority of their time browsing online text (Large & Beheshti, 2000) and lack the proficiency to read and summarize information online, even after practice and instruction (Dwyer, 2010).

Findings additionally suggest students do not take the opportunity to evaluate Web site information which is particularly troublesome when considering anyone can publish anything on the Internet. To date, much of the research on Web evaluation has shown students struggle most with this online reading skill (Castek, 2008; Leu, Reinking, et al., 2007). Identifying this shortcoming with today's students stresses the importance of raising awareness of Web evaluation. Critical evaluation functions differently and assumes new importance with Internet text (Leu, Zawilinski, et al., 2007). Today's students need to understand the important higher-level, critical evaluation skills required to effectively read on the Internet. Schools must begin to teach and discuss the importance of Web evaluation skills with online text.

This study further suggested students exhibit less confidence with skills associated with online reading compared to the same skills with traditional print. As demonstrated in this study, classroom instruction centered on the new literacies skills of questioning, locating, evaluating, synthesizing, and communicating could improve students' perceived ability of online reading. Teachers may wish to both raise student awareness and provide direct instruction to improve online reading comprehension. This, in turn, could improve how students view themselves as online readers.

Furthermore, this study revealed students from different ethnicities, gender, and socioeconomic statuses reported no significant differences for Internet skill, and only students who receive free and reduced lunch reported a significantly greater mean for Internet use. This contradicts past research revealing students from lower SES families have fewer opportunities to develop Internet proficiencies and reported lower level of self-confidence with ICTs (Vekiri, 2010). Caution should be issued when interpreting

these results. This study was limited to a suburban school with an overwhelming population of Caucasian students. This research needs to be conducted with a more diverse population of students. Conducting this questionnaire outside of a suburban school district may provide findings more in sync with past research showing ethnicity and family income correspond with lower levels of Internet use and availability (Beckner, 2000), as well as Internet skill (Henry, 2007; Zhi-Jin, 2011).

On the other hand, future research should further examine the differences exhibited between high performing schools and those serving primarily disadvantaged students on Internet use and skill. Possibly high performing schools may question the established research stating disadvantaged children are less likely to use the Internet, suggesting the Digital Divide is more likely an issue of relevance *between schools* dividing the high performing school from the low performing schools, rather than something that will be a factor sensitive to student differences *within one school*.

Finally, keep in mind this study did not enable the re-administration of the Internet Usage Questionnaire after intervention. The field would benefit from revisiting self-reported Internet use and skill following the intervention lessons to determine if student growth in perceived ability was impacted as well as actual ability. Further research is encouraged to explore how explicit online reading instruction might shift student awareness of Internet use and skill.

Predicting Initial Online Reading Comprehension

The regression analysis revealed three predictor variables accounted for a significant amount of variance (28%) on performance on the ORCA Elementary-Revised. First,

prior academic achievement on two norm-referenced measures of English/Language Arts (ELA ISTEP+ and SRI) significantly impacted performance. Second, self-reported Internet use was a significant predictor of online reading performance. For this population of students, gender, socioeconomic status, and self-reported Internet skill were not significant predictors of online reading performance.

These findings are consistent with past research that shows traditional and online reading performances were not necessarily isomorphic, but rather require both similar and more complex skills (Coiro & Dobler, 2007). In an international study across 16 countries (outside of the United States), a close relationship between student performance in digital print and traditional print was determined (Program for International Student Assessment (PISA), 2009). More specifically, Coiro (2007) found a significant correlation between prior reading achievement on standardized reading assessments and her online reading comprehension measures (ORCA-Scenario I and II). These results, however, contradict a similar study (Leu, et al., 2005), which showed no relationship between online reading and standardized reading ability assessments.

Differences between these results may be due to the nature and involvement of the online reading assessment. The ORCA Elementary-Revised required students to type in responses on a separate platform resembling short answer format. Students were asked to identify specific information found within a Web site and synthesize the information in their responses. Many of the synthesizing, evaluating, and communicating tasks resembled the type of comprehension responses given with traditional text. The measure found in the contradictory study (Leu, et al., 2005) incorporated a weblog (ORCA-Blog) to post student responses. Additionally, each task in the ORCA-Blog required students to

develop a search query for each of the three tasks. In two out of the three tasks, for example, students were asked to find *any* site that fit the stated criteria (i.e. *Post a web site with a good animated graphic about the human respiratory system. The site should ...*), in contrast to locating a *specific* site as stated the assessments used by both Coiro (2007), Castek (2008), and in the current study (i.e. *We want to find the sea otter interactive on the Monterey Bay Aquarium Web site.*). The difference in questioning and locating information may have possibly contributed to the discrepancies between standardized reading and online reading assessments in these studies.

Another consideration is the format of Task 4 on the ORCA Elementary-Revised used in this study. Task 4 provided three direct links to Web information. Direct links were used in previous online reading measures (see, Coiro, 2007; Castek, 2008) to evaluate students' comprehension of online print eliminating the need to first locate the required information. Because the ORCA-Blog included more "gatekeeper" skills (Henry, 2006), including downloading an e-mail attachment and posting within a blog medium, students unfamiliar with these platforms may have gotten lost at the outset of the task. Leu and his colleagues additionally focused on several peripheral online reading activities as opposed to a more streamline approach to online reading comprehension found within the ORCA Elementary-Revised. Regardless, being unfamiliar with the skills and strategies needed to communicate responses within online interfaces may widen the disconnect between standardized and online reading achievement, causing high traditional readers to fall behind their tech savvy peers.

Implications for Pedagogy and Future Research

A number of implications for classroom practice emerge from the findings in this regression analysis. Implications related to the prior standardized achievement, Internet use, as well as the unaccounted variance found within the regression analysis will frame this discussion for pedagogy and future research.

Prior standardized achievement. First, the idea that prior standardized achievement on norm-referenced measures of English/Language Arts can predict online reading performance could indicate a need to embed online reading instruction into existing content curriculum. Examining how online reading is both similar and different to reading traditional texts could develop skills and strategies for both types of reading simultaneously. Teachers need to expand the definition of print text to include online text (Coiro, 2008; Dalton & Proctor, 2008) as online texts include new complexities (Coiro, 2003; Coiro & Dobler, 2007) and amplify the literacy skills an individual needs to comprehend (RAND Reading Research Study Group, 2002). For example, instead of using a table of contents, sidebars help students link to alternate concepts. Bookmarking sites and using the “back” button is similar to bookmarking printed text and will prevent students from losing sight of important content (Malloy & Gambrell, 2006). National Education Technology Standards (NETS; International Society for Technology in Education, 2007) have been developed to support effective technology integration in today’s schools. Instructional support and professional development is needed to help teachers understand and effectively implement these standards in educational settings.

Internet use. Findings from the regression analysis also indicate Internet use predicts performance on online reading comprehension above and beyond standardized

measure of reading performance. This explanation is consistent research by Corio (2007) who found performance on one measure of online reading comprehension (ORCA-Scenario I) contributed significantly to performance on a parallel, second measure (ORCA-Scenario II) over and above traditional reading ability and prior knowledge. Considering the majority of students access the Internet outside of the school day (Pew Internet & American Life Project, 2005b), spending on average an hour and a half using the computer outside of school related assignments (Kaiser Family Foundation, 2010), schools must now turn their attention to incorporating technology use to develop critical online reading skills and strategies to support effective use of Internet materials to support learning. Studies such as Bilal (2000) also found Internet use correlated with student success on a searching task. Results from this analysis suggest increasing students' Internet use can indeed enhance online reading comprehension.

Furthermore, from this regression analysis, gender did not play a role in online reading performance. Females, in fact, had a stable advantage over males on the ORCA Elementary-Revised pretest and posttest, but showed no significant advantage on two norm-referenced measures of English/Language Arts (ELA ISTEP+ and SRI). One possible explanation for this gender difference in online reading performance could stem from the response format found within the ORCA Elementary-Revised. The study "How Men and Women Use the Internet" carried out by the PEW Internet and American Life Project found that although men were found to be more "tech savvy", women, in fact, are better online communicators. Additionally this study noted girls ages 12-17 surpass boys in use of social networking sites (2005a). Results from an additional study confirm past research stating men and women report similar amounts of Internet usage, however, men

use the Internet more for leisure and entertainment compared to women taking advantage of the opportunity to communicate and express themselves in online environments (Weiser, 2000). Perhaps the short answer response format used within the ORCA Elementary-Revised appealed more to the girls in this population of students who possibly expressed themselves to a greater degree on the short answer responses. All things considered, these preliminary findings for Internet use were based only on a self-reported scale. Future studies could examine the correlation between Internet use performance and performance on a measure of online reading comprehension as well as the influence of gender on online reading performance.

Future directions. Although the regression analysis employed to investigate RQ2 showed three predictor variables (ELA ISTEP+, SRI, and Internet Use) accounted for a significant amount of variance (28%) in student performance on the ORCA Elementary-Revised pretest, consideration must be given to the remaining 72 % of the variance left unaccounted for. Past work examining a reader's dispositions with online text (Coiro, 2008; Coiro & Putman, 2009) indicate a significant correlation between online reading dispositions and online reading comprehension. This study did not consider how positive beliefs and attitudes towards reading online text possibly influenced performance on online reading comprehension. Future work examining online reading dispositions in relation to an online reading performance measure with a large sample of students, such as the sample found in this study, could provide valuable insight on this potential online reading predictor.

An additional variable unexamined in this study is prior knowledge. A reader's schema, or organized world experience, provides a foundation for determining meaning

with text (Anderson, 2004; Ruddell & Unrau, 2004a). In her work with adolescent learners, Coiro (2007) found topic-specific prior knowledge had a significant effect on the ability to locate information for students with low levels of online reading performance. In essence, students who had struggled with online reading performance on a first measure of online reading (ORCA-Scenario I) were more likely to improve performance levels on a second, parallel measure (ORCA-Scenario II) if they entered the assessment with higher levels of topic-specific prior knowledge. This however was not the case for students scoring average or above average for online reading ability. Additional research (see Dwyer, 2010) found engaging prior knowledge before online reading instruction resulted in higher levels of online reading ability.

In summary, future research is needed to identify and examine the potential outlying predictors of online reading performance as well as support the results found within this study with a more diverse population of students. This issue becomes quite complex when considering the vast amount of predictor variables that could potentially influence online reading performance.

Effect of Online Reading Comprehension Instruction on Student Performance

In the primary research question, statistical analyses revealed significant differences between the experimental and control groups in online reading performance growth. By the end of the study, students in the experimental group showed a greater proficiency with online reading comprehension than students in the control group, despite an initial advantage for the control group at the pretest. Results indicate that teachers varying in experience and Internet familiarity could effectively teach online reading in a classroom

setting, and that students who received this instruction experienced greater success with online reading skills than students who did not.

Results from the subskill analysis show students in the experimental group demonstrated significant improvement over the control group on two of the three subskills (locating and synthesizing). The significant improvement for the subskills of locating and synthesizing indicates students in the experimental group acquired these skills at a greater rate than students who did not receive instruction. Although a means analysis for evaluating information showed significant advantages for the experimental group, the interaction in the analysis did not show significance.

Implications for Pedagogy and Future Research

Internet Reciprocal Teaching. The intervention lessons, which were based on the Internet Reciprocal Teaching Model (IRT; Leu, et al., 2008), was demonstrated as an effective model to improve online reading comprehension for this population of students. Breaking down instruction into a three-phase model, including teacher modeling, guided practice, and Internet inquiry, as well as progressing from simpler to more complex online tasks (Leu & Reinking, 2005) can serve as a foundational model for teaching online reading comprehension to today's students.

The role of student discussion is an additional component of the IRT model and important to take into consideration. Devoting time at the end of each session for students to reflect may have fostered development of new literacies skills for this population of students. Castek (2008) additionally found student collaboration was essential for effective online instruction as students in her study were quick to scaffold each other through the learning process. This may indicate a need for a collaborative

learning environment where students can engage in purposeful conversations to model, explain, negotiate, and teach each other the skills and strategies of online learning. Student-to-student scaffolding may support acquisition of new literacy skills that could not be achieved independently (2008). Guided practice and independent inquiry, incorporated into phases two and three of the IRT model, may have provided students with a sense of ownership, increased independence, and in turn, maximized learning for this population of students. More research is clearly needed on how to develop effective inquiry activities to support collaborative learning with online texts.

This shift from teacher-centered learning to student-centered learning becomes especially important when considering the acquisition of new literacies skills within the IRT model. Both Castek (2008) and Dwyer (2010) found the transition of the role of teacher from transmitter to co-instructor as well as fostering peer-to-peer scaffolding were essential for collaborative learning with online text. Understanding how to shift instructional roles to increase student modeling may cause some discomfort for teachers who view themselves as novice users of technology. Students and teachers must work together to develop an understanding of these changing relationships that occur with online literacy practice (Coiro, 2009b). Shifting teacher and student roles as well as providing students the opportunity to meaningfully engage in inquiry tasks may be unfamiliar and challenging for teachers requiring pedagogical support and professional development to support instruction within the IRT model.

Subskill instruction. Results from the subskill analysis showed a significant effect for two out of the three new literacies skills (locating and synthesizing) indicating students in the experimental group acquired these skills at an increased pace over

students in the control group. Despite the significant differences noted for locating and synthesizing, results did not show a significantly greater gain for the experimental group on critical evaluation. These results are comparable to Castek's (2008) findings whose participants showed no gains for two tasks on the ORCA-Elementary that involved higher level critical evaluation skills. Each of the three subskills will be discussed along with implications for classroom instruction and future research.

First, the skill of locating or searching for information, noted as a "gatekeeper" skill (Henry, 2006), is a fundamental component of online reading. Kuiper (2008) noted 5th grade students as impulsive Web searchers who tend to get lost in the searching process. Past research has shown peer-to-peer collaboration can improve students' searching ability (Lazonder, 2005). Incorporating peer-to-peer collaboration within each intervention lesson in this study, perhaps improved students' ability to search the Web during phase two of IRT.

Throughout the entire ORCA Elementary-Revised, the skills titled "Nuts and Bolts" taught within the first online reading comprehension session, were basic proficiencies to support students in their quest to locate information. Because each task on the ORCA Elementary-Revised was limited to only 15 minutes, a solid understanding of how to navigate effectively through a Web site was essential. The highly significant gains for the experimental group on the subskill of locating information ($p=.0001$), may indicate how teaching the basic proficiencies of online reading can greatly impact performance. For example, students were asked to communicate the Web address in three of the four tasks. Understanding a universal resource locator (URL), where to find the URL on a Web page, and how to copy and paste the URL into a document would

greatly increase performance on the locating subskill. Students who instead either wrote out the often lengthy and complicated URL by hand, toggled between windows to type in the URL, or spent time searching for a contact address rather than a Web address, may have dwindled away a substantial amount of task time. This “nuts and bolts” instruction, along with additional searching and locating instruction embedded within the thirteen intervention sessions, could have accounted for these notable gains. Although both groups may have understood the task directions, students in the experimental group showed increased automaticity and were more accomplished at searching within the limited time frame. Classroom pedagogy teaching students the tools to support the searching and locating process can provide invaluable skills to create more efficient searchers with online texts. This, in turn, may decrease the frustration students often face when getting lost in the searching process.

Second, the act of synthesizing on the Internet is no easy feat for students (Coiro & Dobler, 2007; Kuiper & Volman, 2005), who must continuously evaluate and summarize across multiple Web sites. Furthermore, the fact that synthesis is an internal process makes this new literacy skill possibly the most difficult to examine and measure (Leu, Zawilinski, et al., 2007). Students in this study reported a decrease in confidence with synthesizing online text compared to summarizing online text at the outset of the study. Results from this study indicate students who receive synthesis instruction, performed better on this subskill as measured by the ORCA Elementary-Revised than students who do not. This study is one of the few that have attempted to teach and measure synthesis. Past studies have examined the effect of synthesis instruction and summarizing instruction with online text for a similar age group (4th and 5th grade

students). Castek (2008) found students who received direct instruction on the new literacies, including synthesis, improved performance on this subskill as measured by the ORCA-Elementary. Adversely, Dwyer (2010) found in general struggle to summarize Web information, even after instruction and practice. The scant amount of research in this area indicates a great need to better understand how to effectively teach and measure this internal process. Additional research across a wider variety of age groups could also better support how this skill is best acquired and measured with online text.

The third subskill, critical evaluation, was shown as the most difficult to acquire. Past research has confirmed higher order thinking and critical evaluation skills are difficult processes for this age group of students (Castek, 2008; Kuiper, 2007; Kuiper, et al., 2008). According to the Kids and Credibility Report (MacArthur Foundation, 2010), the Internet was considered the most credible source of information, over and above books. Not surprisingly, evaluating information proved challenging for students in this study as 70% of all participants reported never checking the accuracy of information, and 83% reported they never investigate the author of a Web site on the Internet Usage Questionnaire. Student responses on the Pretest ORCA Elementary-Revised such as, “I think they are trustworthy because they get it off the internet and the internet does not lie,” or, “ i think this site is reliable because people dont put things online unless they are true,” indicate students’ naivety with Internet text. In anticipation of this struggle, five of the thirteen online reading sessions were focused on critical evaluation skills. Despite this extensive focus on Web evaluation, students continued to struggle with critically analyzing information they read online.

One potential explanation for the insignificant effect could be the limited amount of time given to critically evaluate Web information on the ORCA Elementary-Revised. Within the five evaluation sessions, students learned Web evaluation involves investigating the reliability of content by triangulating the data with three outside sources, investigating the author's credentials, and screening the site's content for bias. In Task 4, students had to evaluate three different Web sites for accuracy and believability. Expecting students to evaluate all three Web sites within the 15-minute time limit may have been unrealistic for this population of fifth grade students.

A second explanation could relate to a lack of proficiency with gatekeeper skills (Henry, 2006), as well as the notion that online reading skills and strategies are interrelated, recursive, and greatly dependent on each other (Coiro, 2007; Coiro & Dobler, 2007). Because there is a high overlap, the inability to develop effective key terms or decipher search engine results may consequently hinder critical evaluation.

For example, on the ORCA Elementary-Revised, students had to evaluate the hoax Web site "Dog Island" (see www.thedogisland.com) where dogs can "live free from the stress and hardship associated with daily life among humans." At first glance, this Web site has a high level of "credibility aesthetic" (Fabos, 2008 p. 862). Links within the website direct the reader's attention to contact information, frequently asked questions, and a copyright date. If the reader neglects to locate the disclaimer link found in small print at the bottom of the page, the aesthetic appeal of this Web site may appear highly credible to the average fifth grade student. Common sense should indicate this Web site is a spoof; however, if students enter the keywords "Dog Island" into a search engine, Dog Island is confirmed as an actual location located off shore of the northwestern

Florida Gulf coast. For instance, one student commented, “i know because i looked up all the places on google maps and only dog island came up as a place.” Students may consider this verification of Dog Island as a “real place” without the developed higher level critical evaluation skills needed to recognize the Web site is simply a hoax developed for entertainment purposes only.

Implications from this subskill analysis indicate students need more instruction on Web evaluation, not in isolation, but rather continuously integrated within the IRT model. Critical evaluation skills may possibly be more effective if lessons are based on a “slow drip” method where discussion around the importance of critical Web evaluation could occur frequently, across all content areas, and throughout the entire school year. This need for a “healthy skepticism” (Leu, Reinking, et al., 2007) when reading online text must become instilled in today’s students to recognize that anyone has the capability to author information on the Web. Undoubtedly, more research is needed to examine how to best teach and assess the subskill of Web evaluation. Future studies can help teachers understand not only how to teach critical evaluation successfully, but also how best to integrate this instruction to impact student understanding.

Future directions. As the Internet is redefining literacy, incorporating online reading skills into Language Arts assessments is necessary for today’s digital age (Coiro & Castek, 2010). Limited research exists on how to effectively measure the online reading process (Coiro, Castek, Henry, et al., 2007). Performance-based measures such as the ORCA Elementary-Revised, are difficult to develop due to the inconsistent nature of Internet text and time-consuming to score. Moreover, developing an assessment that allows students to follow an independent inquiry in an open, networked environment is

anything but simple as no two navigational paths would be the same for each student. Designers of online reading measures must consider the age level, reliability of text, and the classroom time restraints teachers face in on a daily basis. Switching to a multiple-choice assessment would speed up the scoring process but consequently limit interpretation of online reading ability as a result (Coiro & Castek, 2010).

Future consideration must be given to developing optimal assessments for online reading comprehension. Established performance-based measures such as the ORCA-Blog and ORCA IM (Leu, et al., 2005; New Literacies Research Team, 2005), ORCA-Iditarod (Coiro, Castek, & Henry, 2007; Leu & Reinking, 2005), ORCA-Scenario I and II (Coiro, 2007), ORCA-Elementary (Castek, 2008), and the ORCA Elementary-Revised used in this study have only begun to investigate potential possibilities for online reading assessment. More work is needed to determine how to best measure the complexities of online reading and expand measures to assess a wide variety of age groups. Considering online reading is collaborative in nature, shifting to a group assessment versus an individual assessment may better represent communication in today's workforce. In addition, making the online reading assessment authentic and incorporating online communication tools students might utilize outside of the classroom and in their future workplace should be a consideration (Coiro, 2010, April; Coiro & Castek, 2010). Classroom teachers need instructional support and professional development to develop and assess authentic online reading assessments. Future literacy assessments need to consider elements of assessment for 21st Century learning (National Council for Teachers of English, 2008).

Limitations

This study conducted with 5th grade students was predominately designed to examine the effect of intervention sessions on online reading performance. The intervention sessions were designed to standardize the information presented to students in the experimental group. Results open up possibilities for effective online reading comprehension instruction in today's classrooms. Despite these encouraging results, potential limitations to this study may have impacted the results to a degree.

Length of study. The 12-week continuous duration of the study with eight weeks of intervention lessons may have limited potential achievement gains. Measuring online reading proficiencies throughout the course of a school year could have provided a more authentic integration with curriculum and new literacies development. Specifically, gains in critical evaluation may have been noted with a longer intervention.

Classroom instruction. The methods, materials, and setting resulted in a high level of ecological validity for this study. The researcher provided scripted lessons, presentations, and materials for all teachers in the experimental group. Despite the real-life instructional setting and the attempt to standardize content, teacher differences and teaching styles ultimately played into classroom instruction.

External validity. The large sample size, predominately White middle-class students, obtained from a single geographic location limits the external validity of this study. Findings may have been different with a more diverse population of students.

Dependable technology. The limitations of reliable technology impacted the effectiveness of the intervention lessons. The laptops used in this study were dated and often had difficulty connecting to the network limiting the one-to-one ratio of student to

computer usage. In spite of this hardship, students and teachers were flexible with sharing resources to accommodate these issues.

Final Thoughts

Despite our extensive knowledge of traditional reading comprehension we are only beginning to unveil the complexities for reading in online environments. The RAND Reading Study Group (2002) noted the increased demands the Internet makes on an individual's literacy skills with little known about how to specifically teach those critical skills. Electronic texts present both challenges and opportunities for comprehension instruction. "A large gap needs to be filled between the available electronic and multimedia materials and the teachers' understanding of how the materials should be integrated with curriculum" (p. 25).

There is no question that further research is needed on the effects of intervention lessons on online reading comprehension. This is one of the few experimental studies, with perhaps the largest sample of participants, to test the effect of online reading lessons on online reading performance. The lessons designed in this study open up new possibilities for online literacy curriculum development. No study to date has examined the effect of a packaged curriculum designed around the new literacies perspective (Leu, et al., 2004). This study adds to the field by providing assembled, scripted lessons designed to support all teachers, even novice technology users, with integrating new literacies into classroom instruction. This work can inform future efforts as to how to best teach the skills and strategies of online reading. These results, coupled with the

limited past research, would be an indication of the importance for schools to further examine the impact of online reading comprehension instruction on student learning.

In sum, this study revealed interventions lessons on new literacies skills improved online reading performance with a population of 5th grade students. Lessons, such as the lessons developed for this study, designed specifically for online texts can help readers gain confidence and acquire online reading proficiencies when reading in open environments. There is still much to be learned about the effect of online reading instruction. As the Internet is redefining what it means to be literate, teachers must be trained on effective strategy instruction, and they should incorporate new technologies into content instruction. Today's students must be prepared for our global economy, and it is our responsibility to prepare them.

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Appendix A

Internet Usage Questionnaire

Appendix A

Internet Usage Questionnaire

Internet Use Questionnaire

Important Information:

Directions: Listed below are statements about technology and reading online. Please read each statement carefully. Then put a mark in the box that best answers each question.

1. My age is:

- ☐ A. 9
 - ☐ B. 10
 - ☐ C. 11
 - ☐ D. 12
-

2. I am a:

- ☐ A. girl
 - ☐ B. boy
-

3. How would you rate your **overall reading ability**?

- ☐ A. I am a very good reader
 - ☐ B. I am an average reader
 - ☐ C. I don't read very well
-

4. How would you rate your ability to read on the **Internet**?

- ☐ A. I am a very good reader on the Internet
 - ☐ B. I am an average reader on the Internet
 - ☐ C. I don't read very well on the Internet
-

5. How many computers in your home are connected to the Internet?

- ☐ A. 0
 - ☐ B. 1
 - ☐ C. 2
 - ☐ D. 3 or more
-

6. I use the Internet in the following places: (Check all that apply) ☐ A. School

- ☐ B. Home
- ☐ C. Public Library
- ☐ D. Internet cafe or community center
- ☐ E. Relative's House
- ☐ F. Friend's house
- ☐ G. I don't use the Internet

Other _____

7. Where do you use the Internet **MOST** often?

- ☐ A. Home
 - ☐ B. School
 - Someplace else _____
-

How often do you use the Internet?

	Never	Less than once a week	Once a week	A Few times each week	Once a day	Several times a day
I use the Internet at school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet outside of school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How often do you do the following activities ON THE INTERNET OUTSIDE OF SCHOOL?

	Never	Less than once a week	Once a week	A Few times each week	Once a day	Several times a day
I use the Internet to find things on search engines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to read or write email	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use Instant Messenger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to read or post to blogs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use chat rooms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to access a social network (i.e. Facebook, My Space)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to download music	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to view videos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to read about sports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to read about movies, music, or pop culture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Never	Less than once a week	Once a week	A Few times each week	Once a day	Several times a day
I use the Internet find clip art and pictures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to view clip art or pictures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to learn about things that interest me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to read about current events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to read about school related assignments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to buy things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to play games	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to create websites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to check the accuracy of information on websites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I use the Internet to see who created info on websites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. How would you rate your ability to **summarize** information you read on the Internet? **Summarize** means to pick the main points.

Appendix B

Protocol for Administering the ORCA Elementary-Revised Pretest/Posttest

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Protocol for Administering the ORCA Elementary-Revised Pretest/Posttest

Reading Assessment

1. Insert the following link into your class ANGEL page. Please place this link within your “documents” folder by adding a URL link.
 - a. <http://inquisitor.bsu.edu/inqsit/signin.cgi/export/home/putman2/taradiss?ORCAElementaryTask1>
2. Give this link the title “Online Reading Task”

Reading Computers

1. Power on computer.
2. Test Internet connectivity.
3. Reset the browser log of web sites visited in Internet Explorer. Do this by going to tools, and find the option for resetting Internet browser.
 - a. Tools
 - b. Delete Browsing History
 - c. Click "delete all" button
 - d. Click “close” to close menu window.

Task Administration

1. Have students sit at a computer and log into their account using their username and password.
2. Instruct students to click on the desktop link to access their ANGEL account.
3. Instruct students to click on the “documents” tab to access the online reading task link.
4. Once students are on the log in page, have them sit quietly and wait for instruction
5. Please read the following instructions to students out loud:

Today you will complete a series of tasks to help other fifth grade students find information on the Internet. There are a total of 4 tasks you will be completing today. Each of the tasks will require you to write a response to the students in the space provided. You will not be given specific directions on how to do this, simply try what you think is best. You will be allowed up to fifteen minutes to complete each task. Once your fifteen minutes are up, you will be instructed to move to the next task regardless if you are finished. If you finish the task early, you can go on to the next task by clicking the “continue to task ____” button at the bottom of the page. There will be a timer in the top right corner of your screen to help you keep track of time.

6. Prepare kids to pace themselves. A sample set of directions follows:

Pretest

We understand that all students have different amounts of skill for using the Internet.

The tasks you will complete may require you to do things that you have never learned to do before. Just do the best you can. We are trying to get a better idea of what is easy for you and what is hard for you. Just do your best. Although you may not finish, you are expected to work hard and try your best. By the end of the lessons, you will have learned more about using the Internet and you'll have the opportunity to complete these tasks again. For now, work hard and try your best.

Posttest

We understand that all students have different amounts of skill for using the Internet. The tasks you will complete may require you to do things that you have never learned to do before. Just do the best you can. We are trying to get a better idea of what is easy for you and what is hard for you. Just do your best. Although you may not finish, you are expected to work hard and try your best.

7. Then, explain:

If you do not understand something during any of the tasks, please raise your hand. Does anyone have any questions before we continue?

8. Then read:

We are going to begin with task 1. Please read all the directions carefully before you begin. You will notice there are specific things the students want you to do and specific things they'd like you to tell them in your response back to them. Be as specific as possible in your response.

To log into the first task, enter in your student ID number in the box. Then, you will need to read the instructions and answer the questions in the spaces provided.

You can start now. Raise your hand if you have any questions.

Responses to student questions:

- 1. Try to figure that out.*
- 2. Do your best to tell the kids what they want to know.*
- 3. That's a good question, can you figure it out?*

About 2-3 minutes before the 15 minutes are up, ask students who are still working within the task to check their timer, finish up their thoughts, and submit their response(s).

Concluding Assessment

1. When all students from your language arts classes have successfully completed the ORCA Elementary-Revised as a pretest, please delete the link from your ANGEL class page. Before administering the posttest, please set up the link again so students are able to access the assessment and repeat the same protocol.

Appendix C

ORCA Elementary-Revised Tasks and Rubrics

Appendix C

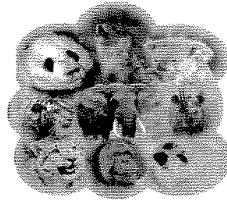
ORCA Elementary-Revised Tasks and Rubrics

ORCAElementaryTask1

Important Information:

- You will be given 15 minutes to finish.

Task 1- Main Causes of Animal Endangerment



We are 5th graders at Edwards School in Vancouver, Canada. We are looking for a site we lost called **Endangered Animals around the World** made by the BBC.

Can you:

- find this site
- read the information about the eight animals AND
- send us the site's website address?

You may [click here](#) to open a new window to search, but be sure NOT to close out of this task!

1. Please list the website address below

2. What are the main reasons why animals become endangered?

3. What can kids do to help?

Task 1: Main Causes of Animal Endangerment Rubric

1A. Locate BBC site.

0 = *Task not successfully completed* - no answer is given for this part of the question or "I didn't find it."

1 = *Partially correct*: found a similar site about endangered animals, but not the BBC site. (ex: Thinkquest) OR found the BBC site, but not the section of the site the talked about endangered animals.

2 = *Task successfully completed*: located the BBC site (animated version).

Correct answers:

Animated Version:

<http://news.bbc.co.uk/cbbcnews/hi/static/guides/animals/animals.stm>

NON-Animated Version:

http://news.bbc.co.uk/cbbcnews/hi/find_out/guides/animals/endangered_animals_world/newsid_1614000/1614414.stm

1B. Explain the main reason(s) why animals become endangered (based on information on the site)

0 = *Task not successfully completed* - no answer was given for this part of the question.

1 = *Response wasn't based on the results of an Internet search*. Students talked about endangered animals using their prior knowledge (no URL was listed).

2 = *Response was partially correct*. Student collected information from a different site (ex: Thinkquest). At least one reason why animals become endangered was given.

3 = *Response was correct but incomplete*. Student collected information from the correct site. Only one reason why animals become endangered was given.

4 = *Response was correct and complete*. Student collected information from the correct site and explained at least two reasons.

Correct answers:

To receive a "4" students should include at least 2 reasons from the following list. Humans: 1. use their skin for fashion, 2. are cutting down the animal's habitat, are hunting animals for sport. Also: humans are expanding the population and taking over the animals' land. Humans are using animal parts as medicine. Animals' eggs are being stolen. Any logical paraphrase of these answers is correct.

1C. Explained what kids can do to help (based on info from the site).

0 = *Task not successfully completed* - no answer was given for this part of the question.

1 = *Response wasn't based on the results of an Internet search*. Students talked about what kids can do to help based on their prior knowledge (no URL was listed for a site they found).

2 = *Response was partially correct*. Student collected information about what kids can do to help from a different site (ex: Thinkquest). Answers are logical but don't line up with what the BBC site said.

3 = *Response was correct but incomplete*. Student collected information from the site and provided only one way kids could help (possible ways kids can help, based on the BBC site, are listed below).

4 = *Response was correct and complete*. Student collected information from the correct site and provided at least two ways kids could help (possible ways kids can help, based on information from the BBC site, are listed). Correct answers: adopt and animal, be green, shop wisely, find out more. Related ideas are also acceptable.

ORCAElementaryTask2

Important Information:

- You will be given 15 minutes to finish.

Task 2- How many otter species are there?



We are 5th graders from Lincoln, Nebraska. We've been looking but we don't know for sure how many species of otters there are. Our teacher says that the sites we get information from should be made by experts. We found one website, but we're not sure if we can trust the source.

Can you:

- find out how many otter species there are?
- find more than one site that gives the same number of species?
- post the names and address of the sites where you find the number of species?
- explain whether the sites you found are reliable (trustworthy) sources of information?

You may [click here](#) to open a new window to search, but be sure NOT to close out of this task!

1. How many otter species are there?

2. Is there another site that gives the same number of species? If so, please list the website below:

3. Explain why you think the sites you found are reliable (trustworthy)

Task 2: How many otter species are there? Rubric

2A. Locate number of otter species and locate a second site where this information could be verified.

0 = Task not successfully completed - no answer or "I couldn't find it"

1 = Response wasn't based on the results of an Internet search. Ex: there are many kinds (no URL provided). OR Provided a response that was incorrect (such as there are over 2,000 otter species).

2 = Response was correct; found the correct information.

Answer: There are 13 species of otters.

2B. Locate number of otter species and locate a second site where this information could be verified.

0 = Task not successfully completed - no answer or "I couldn't find it"

1 = Response was partially correct: found the correct information for task 2A AND provided AT LEAST one URL or SITE TITLE for where the number of species was listed, OR gave a URL that linked to the number of otter species but did not tell how many species in the response.

2 = Response was correct and complete: found the correct information AND provided AT LEAST two URLs or SITE TITLES for sites where the number of species was listed.

Answer: There are 13 species of otters. Sites that list these facts will vary.

2C. Are sites reliable?

0 = Task not successfully completed, no answer was provided. No understanding of what reliability is.

1 = Response wasn't based on an investigation of the site, but the student addressed reliability in some fashion. Student assumed info was accurate based on prior knowledge. No reasons were given to explain reliability OR reasons were not logical.

2 = Provided an answer that reflected an attempt to investigate the site as a reliable source. Student provided a logical answer to explain why the site should be trusted such as comparing information on two different sites and looking into who the author is and how they can be contacted.

Answer: These sites are made by wildlife experts and scientists who study/know about otters.

ORCAElementaryTask3

Important Information:

- You will be given 15 minutes to finish.

Task 3- All About Sea Otters



We are 5th graders from Exmouth, Australia. We know that otters live in most areas of the world but they don't live in Australia or Antarctica. We read that Monterey Bay Aquarium protects sea otters. We want to find the sea otter interactive on the Monterey Bay Aquarium's website.

Can you:

- find the sea otter interactive?
- post the address of the sea otter interactive?

Tell:

- who made this interactive? (We want to email a bunch of sea otter experts.)
- are the makers experts? How do you know?

1. Please list the website address of the sea otter interactive below

2. Who made the interactive?

3. Are the makers experts? How do you know?

Task 3: All About Sea Otters Rubric

3A. Find the sea otter interactive AND give the URL

0 = *Task not successfully completed* - no answer is given for this part of the question or “I didn’t find it”. Didn’t give a URL at all.

1 = *Too general*: Located a webpage related to sea otters but it was NOT made by Monterey Bay Aquarium. They must give a URL in to order to get credit.

2 = *Partially correct*: Found the information about sea otters on the Monterey Bay Aquarium site, but did not locate the interactive

3 = *Task successfully completed*: located the *Sea Otter Interactive* with in the Monterey Bay Aquarium site and gave the correct URL.

Correct answers:

http://www.mbayaq.org/media/all_about_otters/whatsanotter01.html

OR <http://www.alanbrimm.com/mbay/otter/otterfinalopen.htm>

OR http://www.montereybayaquarium.org/media/all_about_otters/whatsanotter01.

3B. Correctly identify the site’s creator by explaining who made the interactive

0 = *Task not successfully completed*: no answer is given for this part of the question, response not relevant to the question, or “I didn’t find it”.

1 = *Incorrect answer*: student said the site was made by “the sea otter club” or other incorrect response.

2 = *Too general*: The maker of the site was listed in general terms as “Monterrey Bay Aquarium” (MBA).

3 = *Response was correct and complete*: The site was created by the “Monterrey Bay Aquarium Foundation.”

Correct answer:

Monterrey Bay Aquarium Foundation made this site. This information is listed in the lower left hand corner of the sea otter animation.

3C. Explain whether or not the creator can be considered an expert on the topic

0 = *Task not successfully completed*: no answer is given for this part of the question.

1 = *Incorrect answer*: student says that I found it on Google so it must be correct. Or everything on the Internet is correct (or related answer to indicate the student believes that everything online is true).

2 = *Partially correct*: student didn’t explicitly state a reason. A general statement was included to show that the makers knew a lot of information.

3 = *Task successfully completed*: provided a logical reason based on learning something about the author and/or the information. (ex: It was made by Monterey Bay Aquarium Foundation. The people can be trusted, they studied sea otters for some time).

Correct answer:

This foundation carefully studies sea otters. They have many scientists who work with them. The information they give about sea otters is on lots of others sites too. The mission of the non-profit Monterey

ORCAElementaryTask4

Important Information:

- You will be given 15 minutes to finish.

Task 4- Me and My Dog



I am a 5th grader and I have a great dog that I love a lot. Her name is Flash. My family wants to go on vacation and I know Flash would like to go too. I heard that lots of times what you read on the Internet isn't true and I'm not sure about these places. They may just want our money.

Dog paddling Adventures: <http://dogpaddlingadventures.com>

• **Dog Island:** <http://www.thedogisland.com>

• **Camp Winnaribbun:** <http://www.campwinnaribbun.com>

Can you look at these sites and let me know:

- Which of these places is real?
- How do you know if they are real or not? Why you think so?

1. Which of these three websites are real?

2. How do you know, and why do you think so?

3. What are some ways these places will make sure my dog is safe?

Task 4: Me and My Dog Rubric

4a. Determined which site(s) are real

0 = *Task not successfully completed*: No answer was given or student wrote "I don't know"
OR *Identifies none of the sites correctly. Says or implies dog island is real. OR Gives other incorrect answer.*

1 = *Partially correct*: identifies one of the sites correctly.

2 = *Correct but incomplete*: identifies two of the sites correctly.

3 = *Correct and complete*: identifies all three of the sites correctly.

Correct Answer:

Dog Paddling Adventures and Camp Winnaribbun are real places you can go with your dog.
Dog Island is a hoax website.

4b. Reasons for their choice demonstrate proficiency in critical evaluation.

0 = *Task not successfully completed*: no answer is given for this part of the question.

Misunderstood question: response did not state or explain reasons why the sites were real or not. *Incorrect Answer*: Student explained reasons why *Dog Island* is a real place. May also mention the other(s).

1 = *Partially correct*: student implied the sites were real/fake but reasoning wasn't based on any info. They addressed (i.e. they drew a conclusion but did not provide ANY evidence as to why they felt that way). Mentioned a strategy for how they could check whether it was false or not.

2 = *Correct but incomplete*. Student reasoned that the sites were real./fake prior knowledge (domestic dogs can't live without people, dogs don't behave that way, etc.)

3 = *Task successfully completed*: provided a logical a reason based on learning something about the author and/or the information or the author's contact information. Ask for references, etc. (ex: I googled it and learned it was a hoax, the authors made the site look real, but they are playing a trick to make people laugh, etc.) Mentioned a strategy for how they could check whether it was false or not.

4C. Provided ways places ensured safety for the dogs (based on info from the site).

0 = *Task not successfully completed* - no answer was given for this part of the question OR response does not answer the question correctly by providing a way dogs can stay safe.

1 = *Response wasn't based on the results of a synthesis from the websites*. Students talked about ways dogs can be safe on vacation from their own prior knowledge.

2 = *Response was partially correct*. Student collected information on ways dogs can stay safe but only included ideas from one of the websites.

3 = *Response was correct and complete*. Student collected information from more than one site and provided at least two ways dogs could be kept safe (possible ways dogs are kept safe, based on information from each sits are listed).

Correct answers:

Dog Paddling Adventures: trained first air responders for people and pets, life vests for dogs, introductory classes, surrounded by dog lovers, stable canoes

Dog Island: separate islands for different size dogs, limitless free space, immunization and naturalization center, health and fitness boot camp dog training center, wildlife behavioral recovery center, family building mentoring center, injury and trauma recovery center, caves for shelter

Camp Winnaribbun: provide crates, fenced in, locked, private forest, private beach, offer pet obedience

Appendix D

Consent Form

Appendix D

Consent Form

Online Reading

The purpose of this research is to teach students to the strategies needed to be successful learners with Internet text in online environments. While students undoubtedly enjoy using the Internet, electronic texts present new challenges for today's learners. It becomes especially important to know and practice the reading comprehension strategies readers need to successfully comprehend text in online environments. There is a great need for research to examine the effect of strategy instruction on online reading comprehension assessments. The skills required to successfully comprehend online text differ from traditional texts. Electronic texts provide new purposes for the reader, new text layouts to comprehend, and new approaches to text interactions. This study will examine the relationship between new literacies skills and reading comprehension with online texts. Lesson plans teaching students specific new literacies are needed to prepare students for 21st century learning. The researcher hopes to examine how traditional reading performance along with selected demographic variables affects performance on an online reading comprehension assessment. The activities of this project will further aid educators' efforts to develop curriculum supporting the new skills students must implement to effectively comprehend texts in online environments.

As part of your child's regular classroom instruction, your child may complete a series of 10-12 lessons teaching critical online reading comprehension skills (strategies to improve reviewing online content for classroom research). All lesson plans and online assessments will take place during your child's scheduled Language Arts rotation. Your child will complete a short questionnaire about his/her experiences with reading Internet text as well as an online reading comprehension skill test at the beginning and end of the lesson series to see what skills she or he gained. This skill test will not be a part of your child's class grades. If you grant permission for your child to participate in the research project, your permission will allow the researcher to access information on file with the school, including gender, race, age, free and reduced lunch status, identified special needs, her or his standardized reading scores from the Indiana Statewide Testing for Educational Progress Plus (ISTEP+) and lexile scores on the Scholastic Reading inventory (SRI). Student ID numbers will be provided to the researcher and used to maintain confidentiality. All data will be maintained as confidential and no identifying information such as names will appear in any publication or presentation of the data. Data will also be stored in a secure location and all data files will be password protected. It is important to note that during the project period, not all children will complete the online reading strategy lesson plans. This is to allow the researcher to examine the effects of this instructional strategy on online comprehension assessment as compared to similar students who do not participate in the program. Participation in this study is completely voluntary and you are free to withdraw your permission at anytime for any reason without penalty or prejudice from the researcher. Please feel free to ask any questions of the researcher before signing this Parental Permission form and at any time during the study. For one's rights as a research subject, you may contact the following: Research Compliance, Office of Academic Research and Sponsored Programs, Ball State University, Muncie, IN 47306, (765) 285-5070, irb@bsu.edu.

Parental Consent

I give permission for my child to participate in this research project entitled, "Integrating new literacy instruction to support online reading comprehension: an examination of online literacy performance in 5th grade classrooms." I have had the study explained to me and my questions have been answered to my satisfaction. I have read the description of this project and give my permission for my child to participate. I understand that I will receive a copy of this informed consent form to keep for future reference.

Parent's Signature

Date

Child Assent

The research project has been explained to me and I have had the opportunity to ask questions. I understand what I am being asked to do as a participant. I agree to participate in the research.

Child's Signature

Date

Homeroom Teacher**Refusal**

No, I do not wish for the researcher to access my child's information on file with the school. I do not agree to participate in the research.

Parent's Signature

Date

Homeroom Teacher**Researcher Contact Information**

Principal Investigator:

Tara L. Kingsley

PhD Candidate: Elementary Education

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Muncie, IN 47306

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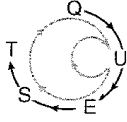
Email: jccassady@bsu.edu

Appendix E

Topic, Theme, Focus Flowchart

Appendix E

Theme, Topic, Focus Flowchart

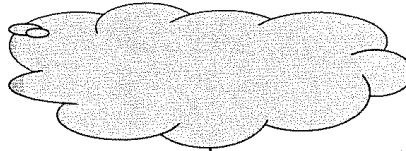


HANDOUT Q-12. Project Planning Flowchart

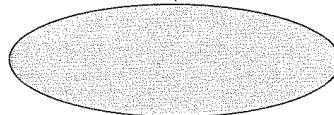
Name _____ Class _____ Date _____

Enter your theme, topic, two focus areas, and two questions into the flowchart.

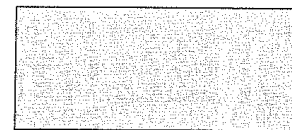
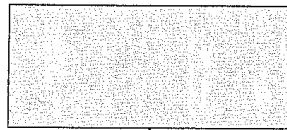
THEME



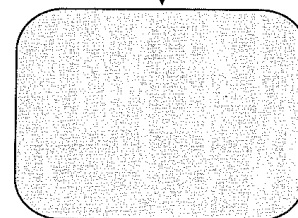
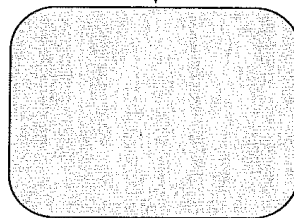
Topic



Focus



Questions



Appendix F

Sample Lesson on Synthesizing Information

Appendix F

Sample Lesson on Synthesizing Information

Skill: Synthesis

Lesson #1: Synthesizing Information

Time Estimate: 45-50 minutes

Overview:

In this lesson, students will learn how to create an online concept map to categorize information from multiple Web sites.

Resources:

- Web application for brainstorming/concept mapping:
<https://bubbl.us/>
- PowerPoint: Synthesizing Information
- Tutorial: Concept Mapping as a Tool for Synthesis (6 minutes)

Preparation:

- Prepare the following link to your ANGEL page to allow students to access the information easily.
 - <https://bubbl.us>
- Have students create an account on bubbl.us
 - Note: this does not require students to enter an e-mail address. Students will be able to save up to three sheets using a free account.
 - Username: have students use their ID number and password to create their account
- Preview the PowerPoint and synthesis tutorial prior to completing this lesson with students.
- Have students take out their theme, topic, and focus areas flow chart.

Instructional Plan:

Phase 1: Teacher Modeling Inquiry

Phase 2: Student Collaboration/Guided Practice

Phase 3:

Phase

Reference

Instruction

1



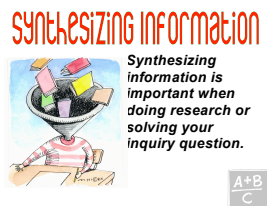
- Have students angle down their laptops or turn off their computer monitors to focus their attention.
- Inform students that today they will be learning how synthesize information across multiple websites.

1



- Discuss with students that synthesizing is a difficult process. It involves bringing together one's prior knowledge, ideas, and learned information to create new knowledge. It can be related to a jigsaw puzzle where individual pieces are combined to create a larger picture. You can also give the example of baking a cake. Separate ingredients are mixed together to form something entirely new (a cake).
- In order to synthesize, students must integrate information from a variety of resources, determine which parts are important, and then find a relationship between the resources to create meaning. This is no easy task!

1



- Synthesis must occur to fully answer an inquiry question or research a topic.

1



- Teach students the difference between a parent and sibling node.

1



- Use the family example to help explain parent and sibling nodes.

1



- Have students angle down laptops or power off monitors to focus their attention.

- Open and view the tutorial: *Concept Mapping as a Tool for Synthesis (6 minutes)*

2-3



- Students are now able to begin synthesizing information by creating a concept map over one or two focus areas within their inquiry topic.
- When students finish, they can print their concept map (if available) AND save their map under their account.

Appendix G

Descriptive Statistics of Internet Use

Appendix G

Descriptive Statistics of Internet Use

<i>I use the Internet to. . .</i>		Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
find things on search engines	E ^a	37%	19%	12%	19%	4%	5%
	C ^b	50%	45%	23%	57%	7%	14%
read or write e-mail	E	33%	20%	16%	14%	5%	10%
	C	32%	21%	13%	18%	8%	6%
use Instant Messenger	E	66%	9%	7%	8%	3%	4%
	C	64%	12%	5%	8%	5%	5%
read or post blogs	E	56%	20%	5%	8%	3%	6%
	C	65%	18%	4%	7%	1%	4%
use chat rooms	E	60%	11%	8%	6%	8%	5%
	C	60%	18%	5%	7%	4%	6%
access a social network	E	53%	6%	6%	13%	8%	14%
	C	59%	9%	4%	11%	6%	10%
download music	E	30%	30%	13%	15%	4%	6%
	C	28%	39%	9%	13%	3%	7%
view videos	E	12.3%	22%	10%	32%	5%	17%
	C	11%	27%	10%	21%	10%	21%
read about sports	E	50%	20%	11%	7%	3%	6%
	C	53%	21%	10%	5%	4%	4%
read about movies, music, or pop culture	E	33%	20%	16%	14%	5%	10%
	C	32%	21%	13%	18%	8%	6%

^aExperimental group

^bControl Group

(continued)

Summary of Internet Use for the Experimental and Control Groups (continued)

<i>I use the Internet to. . .</i>		Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
to find clip art and pictures	E	30%	36%	12%	13%	3%	4%
	C	20%	50%	13%	12%	4%	2%
view clip art and pictures	E	35%	32%	10%	12%	4%	5%
	C	22%	45%	11%	13%	4%	4%
learn about things that interest me	E	21.3%	25%	24%	14%	7%	7%
	C	17%	34%	18%	14%	9%	6%
read about current events	E	36%	28%	17%	8%	5%	1%
	C	34%	37%	13%	8%	4%	2%
read about school related assignments	E	26%	28%	19%	13%	8%	4%
	C	18%	42%	20%	12%	6%	2%
buy things	E	33%	20%	16%	14%	5%	10%
	C	32%	21%	13%	18%	8%	6%
play games	E	3.3%	20%	11%	28%	10%	26%
	C	2%	17%	9%	30%	10%	33%
create websites	E	85%	6%	2%	1%	2%	0%
	C	83%	8%	3%	1%	0%	3%
check the accuracy of information on websites	E	68%	16%	8%	1%	1%	3%
	C	70%	17%	4%	6%	0%	1%
see who created info on websites	E	80%	11%	1%	1%	2%	1%
	C	82%	11%	3%	0%	2%	1%

^aExperimental group

^bControl Group

Appendix H

Descriptive Statistics of Internet Skills

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	Group	Mean	SD
Searching for general information on the Internet (ex: dogs)	Experimental	4.98	2.02
	Control	5.73	2.46
Searching for specific information on the Internet (ex: how large pug dogs grow to be)	Experimental	4.72	2.09
	Control	5.07	2.13
Picking the best site when given a list of search engine results	Experimental	4.23	2.53
	Control	4.94	2.34
Reading information on the Internet	Experimental	5.19	2.60
	Control	5.50	2.35
Writing and sending e-mail messages	Experimental	5.12	2.91
	Control	5.15	3.09
Typing homework assignments or other documents	Experimental	5.44	2.77
	Control	5.67	2.60
Using the Internet to answer a question	Experimental	5.23	2.52
	Control	5.27	2.46
Explaining to classmates ways to get around the Internet	Experimental	4.15	2.48
	Control	4.20	2.04
Explaining to classmates ways to read, write, and share ideas on the Internet	Experimental	3.90	2.40
	Control	3.96	2.28